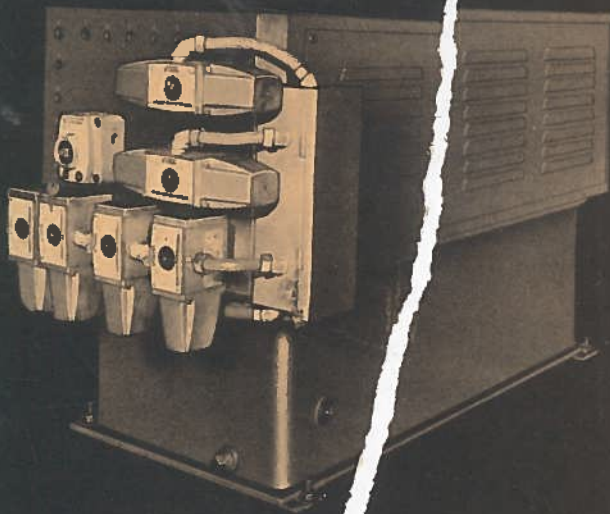
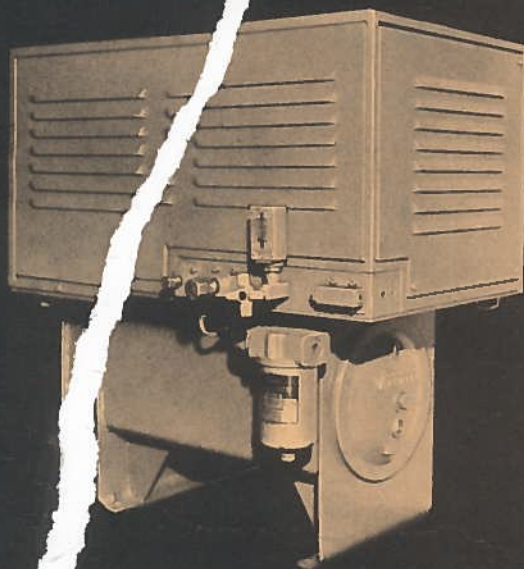


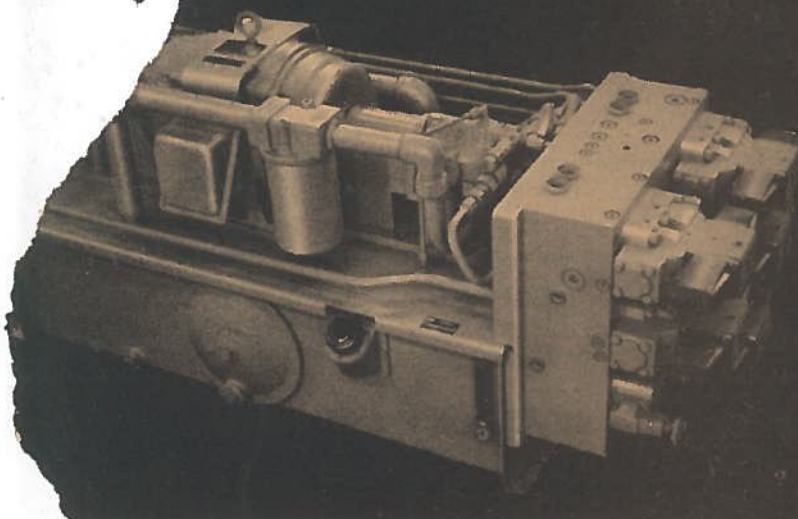
## Custom Built Power Packages



This compact power package is mounted on a special flute grinding machine. The power package has been designed to suit a minimum space envelope. The hydraulic pump and driver is enclosed in a louvered cabinet to prevent chip accumulation on the unit. A valve manifold made a difficult design a reality.



A special boring machine is controlled by this enclosed compact power package. A valve manifold is utilized to reduce the package size.



Food processing machines utilize a custom power unit for all hydraulic functions. The units are compactly designed for maximum space savings with manifold mounted valves and controls to reduce piping, eliminate leakage and provide optimum component accessibility.

**INDEX**  
**SECTION A - POWER PACKAGES**

DESCRIPTION	DWG. NO.	PAGE NO.
PK1 Power Pack		a - 1
PK6 Power Pack	500100	a - 2
T4 Vertical-Pak	500200	a - 3
C-10 Compact Power Package	76-125	a - 5
T10, T20, T60, T100, T150 & T200 Hydraulic Power Packages	78-196	a - 7
T10, T20, T60, T100, T150 & T200 Hydraulic Power Packages	500800-C	10
	500900-C	a - 1

**MODEL CODES**

Model codes in this catalog list many options. Some possible model combinations are not readily available. Please contact your Sperry Vickers representative to verify availability.



# UNEXCELLED FACILITIES

Throughout the world, Sperry Vickers has the facilities and the skilled personnel to give you efficient service, prompt deliveries, volume production, and application and service assistance, when you need it.

# International Manufacturing Facilities

Havant, England  
Tokyo, Japan  
Sao Paulo, Brazil  
Milan, Italy

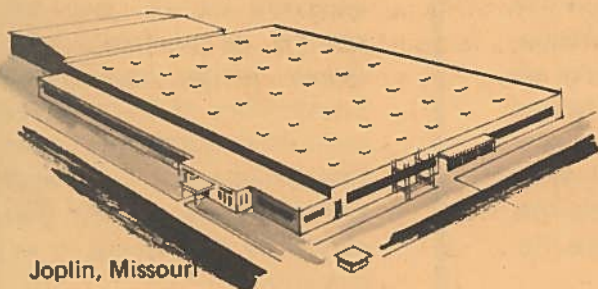
Bad Homburg, Germany  
Hof, Germany  
Maribyrnong, Australia  
Auckland, New Zealand  
Bombay, India



Columbia, Missouri



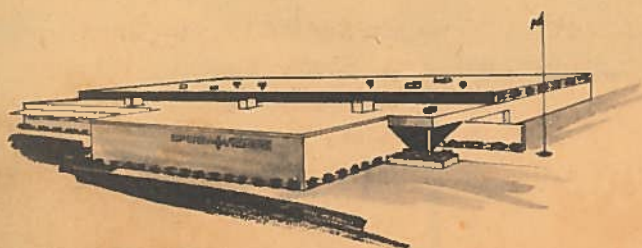
Omaha, Nebraska



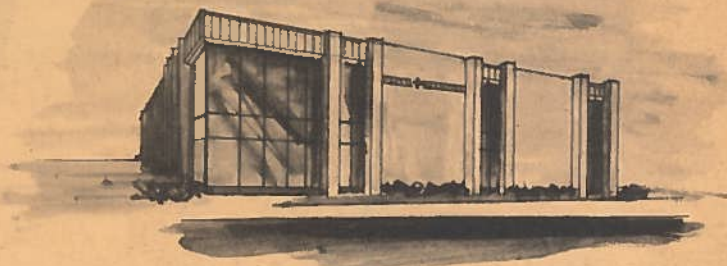
Joplin, Missouri



Searcy, Arkansas



Jackson, Mississippi



Madison Heights, Michigan



Rexdale, Ontario, Canada



Bensenville, Illinois

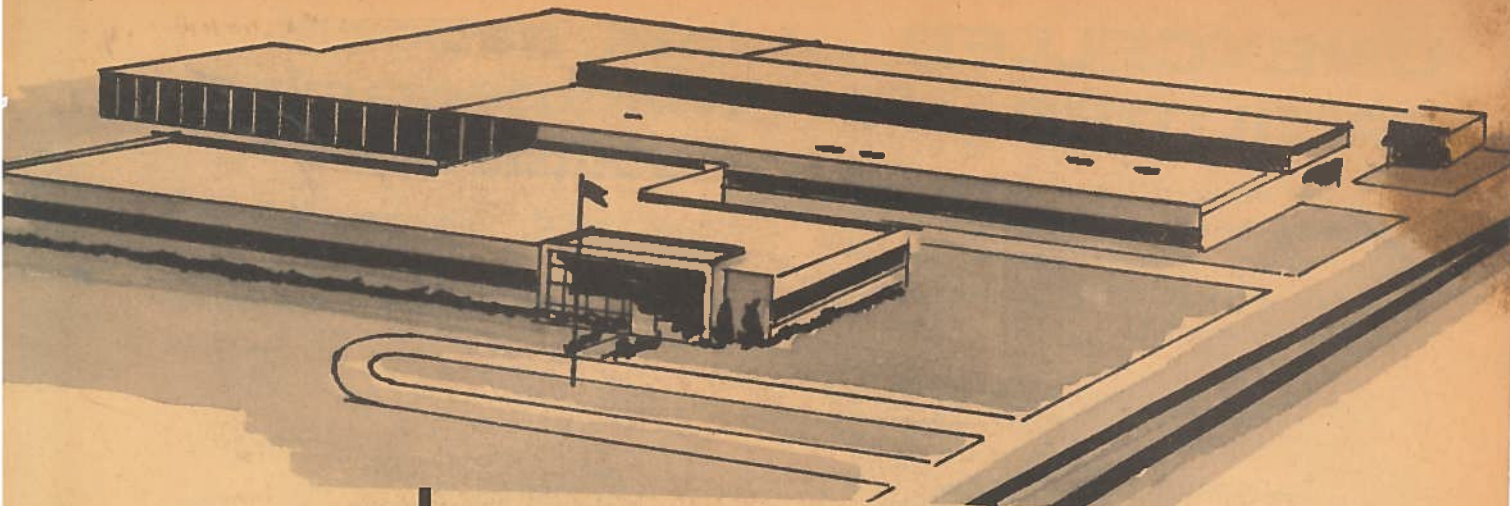


Salem, Ohio



Torrance, California





WORLD HEADQUARTERS  
TROY, MICHIGAN 48064

## COMPETENT APPLICATION ENGINEERING

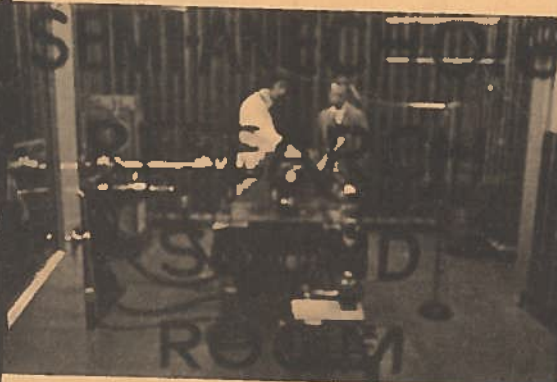
Graduate engineers with responsibility for a single line of hydraulic products, and factory trainees, are available at any time to work with you on all phases of hydraulic applications. Whether your problem is in circuit design or the development of prototype machines, your product quality is assured if you specify Sperry Vickers.

## RESEARCH AND DEVELOPMENT

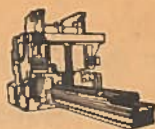
The most complete and efficient facilities to be found anywhere in the industry for the development of hydraulic equipment are yours at Sperry Vickers. The end result is a line of products unsurpassed in quality that provides you with maximum trouble-free performance and long service life.

## SPERRY VICKERS HYDRAULIC SCHOOL

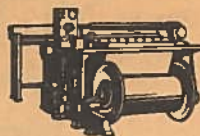
Since 1945, the Sperry Vickers Hydraulic School has offered training to customers in the theory, proper application, and maintenance of hydraulic equipment. Ever-increasing sophistication of hydraulic components and systems has expanded the role played by this school in serving the industry.







Cutting Machinery



Textile Machinery



Antenna Drives



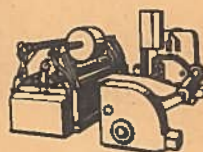
Test Stands



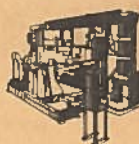
Food Processing

# YOUR SINGLE SOURCE

*for complete hydraulic  
equipment and service*



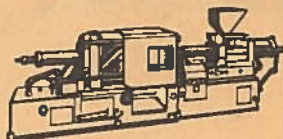
Paper Machinery



Fabricating



Automation for Industry



Plastic Molding Machines

Hydraulic systems have an unquestioned acceptance as a most effective means of transmitting and controlling power. Applications are innumerable in manufacturing, construction, transportation, marine and many other industries. New applications are being developed constantly, making hydraulics increasingly important.

Over five decades of Sperry Vickers experience, every type of hydraulic equipment, backs your hydraulic component or system. You can always depend on Sperry Vickers for the finest and most advanced in hydraulic products and the best in customer service.

**YOU** will find on the following pages, the most complete line of hydraulic products available anywhere—developed by Sperry Vickers of the Sperry Rand Corporation to serve the industrial field.

The catalog introduces new pace-setting products in addition to providing information about improvements made on Sperry Vickers products generally accepted as "industry standards."

## HOW TO USE

Each principal section is keyed alphabetically as shown on the index pages which follow the general information section. Each specific family of products, (vane pumps, flow controls, directional valves, etc.) is described in a separate section.

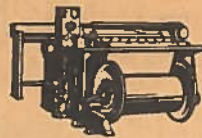
A complete list of all our sales offices, distributors and warehouses is included at the end of this catalog.

**SPERRY**  **VICKERS**  
POWER AND MOTION  
CONTROL SYSTEMS  
TROY, MICHIGAN





Cutting Machinery



Textile Machinery



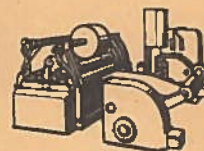
Antenna Drives



Test Stands



Food Processing



Paper Machinery



Fabricating



Plastic Molding Machines



Automation for Industry

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**SPERRY**  **VICKERS**  
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# Leakage Control

**COST OF LEAKAGE**—OSHA and the oil shortage have sensitized industry to leakage. Leakage creates safety hazards, wastes scarce oil, increases machine down-time, decreases production rates, generates product spoilage and boosts replacement parts inventory. The cost of effective leakage control is minor when compared to the long term costs of leakage.

**LEAK-FREE DESIGN**—Hydraulic systems do not need to leak. Today's designer must create a more leak resistant system, where static seal leakage will infrequently exist and dynamic seal leakage will be controlled. Before presenting some design practices proved effective in stopping leaks, we should consider the sources of most leaks.

**CAUSE OF LEAKS**—Almost all hydraulic system leaks occurring after extended service result from three conditions: Loosening of fittings and connectors by shock and vibration; wear of dynamic seals and mating parts (especially in hydraulic cylinders); and, deterioration of the elastomer because of elevated fluid temperatures or an incompatibility with the hydraulic fluid.

**COMBATTING SHOCK AND VIBRATION**—Many things can be done to minimize leakage from loose fittings and connectors subject to shock and vibration:

1. Support all lines with damping mounts to absorb both shock and vibration.
2. Reduce shock with low shock valves or accumulators.
3. Use pressure controls with low overshoot in sufficient numbers to be effective.
4. Use a minimum number of fittings and connectors. Use welded joints wherever practical.
5. Use straight thread connectors, tees, and elbows in place of pipe threads.
6. Use manifolds instead of individual lines wherever possible.
7. Specify proper bolt and plug torque for expected peak pressures to prevent surface separation and static seal nibbling.
8. Stress good workmanship to avoid poorly assembled fittings and connectors.

**REDUCING DYNAMIC SEAL WEAR**—Most dynamic seals are well designed and will provide long, relatively leak-free service if given a reasonable chance. Four things a designer can do to extend the life of dynamic seals are: (1) eliminate side loads on cylinder rod and

drive shaft seals; (2) protect cylinder rods from abrasive dirt with shields or rubber boots; (3) provide good filtering and easily cleaned reservoirs to prevent dirt build-up in the oil; and, (4) keep cylinder rod and shaft speeds as low as possible.

**REQUIREMENTS FOR STATIC SEALS**—A static seal retains fluid between rigid, stationary surfaces. The seal must be compressed as with a gasket or deformed as with an o-ring, to flow into crevices of the rough mating surface and also raise the seal internal stress level higher than the pressure to be sealed. When parts are not rigid enough or bolt preload is not high enough, the mating surfaces will separate under the action of fluid pressure, creating clearances or enlarging those that might exist because the sealing surfaces were not flat enough to start with. With movement of mating surfaces, the static seal becomes a dynamic seal. Rough surfaces will wear the seal and changing clearances nibble seal edges.

**MOUNTING PLATES**—When valve packages or sub-plates are bolted to mounting plates, the condition of the plate is important to obtain a satisfactory initial seal and prevent extrusion and wear. Requirements are: Flat mounting surfaces; good sealing surface finish — 64 micro-inches with no radial scratches; and, high enough bolt preload to prevent surface separation.

**PREVENTING SEAL DETERIORATION**—Premature deterioration of the seal can result from other factors. A primary factor is excessive fluid temperature. A good working rule is that seal life is halved by every 20° F. rise. The cure: Incorporate sufficient heat exchangers to keep fluid temperatures below 150° F.

Another factor may be compatibility of the fluid with the seal material where special fluids are used. If a doubt arises, contact your Sperry Vickers representative. The following brief review of seal materials may be helpful in your discussions.

1. Nitrile (Buna N) is the most widely used and best all around elastomer for petroleum oils, fuel and fire-resistant fluids — with the exception of phosphate esters.
2. Fluoroelastomer, e.g., Viton or Fluorel, costs more than Nitrile, is interchangeable with Nitrile but has the added advantage of longer life when fluid temperatures consistently run above 150° F. It can be used with phosphate ester fluids (except Skydrol).
3. Polyurethane shows extrusion and abrasion resistance superior to Nitrile in petroleum oils, fuel and silicate esters, but deteriorates if contaminated with hot water.



# POWER PACKAGES

Whether the installation calls for a standard or a custom engineered power package, Sperry Vickers provides unmatched experience in designing and building all hydraulic components and the complete units themselves and puts it to work solving your specific problems.

You invariably save money and time in specifying a ready-to-go Sperry Vickers power package designed and assembled by hydraulic specialists to industry's highest standards of quality. All components are "matched" in output—eliminating potential trouble spots. This selection of compatible components is possible only because Sperry Vickers designs and builds the most complete line of hydraulic components and systems available anywhere.



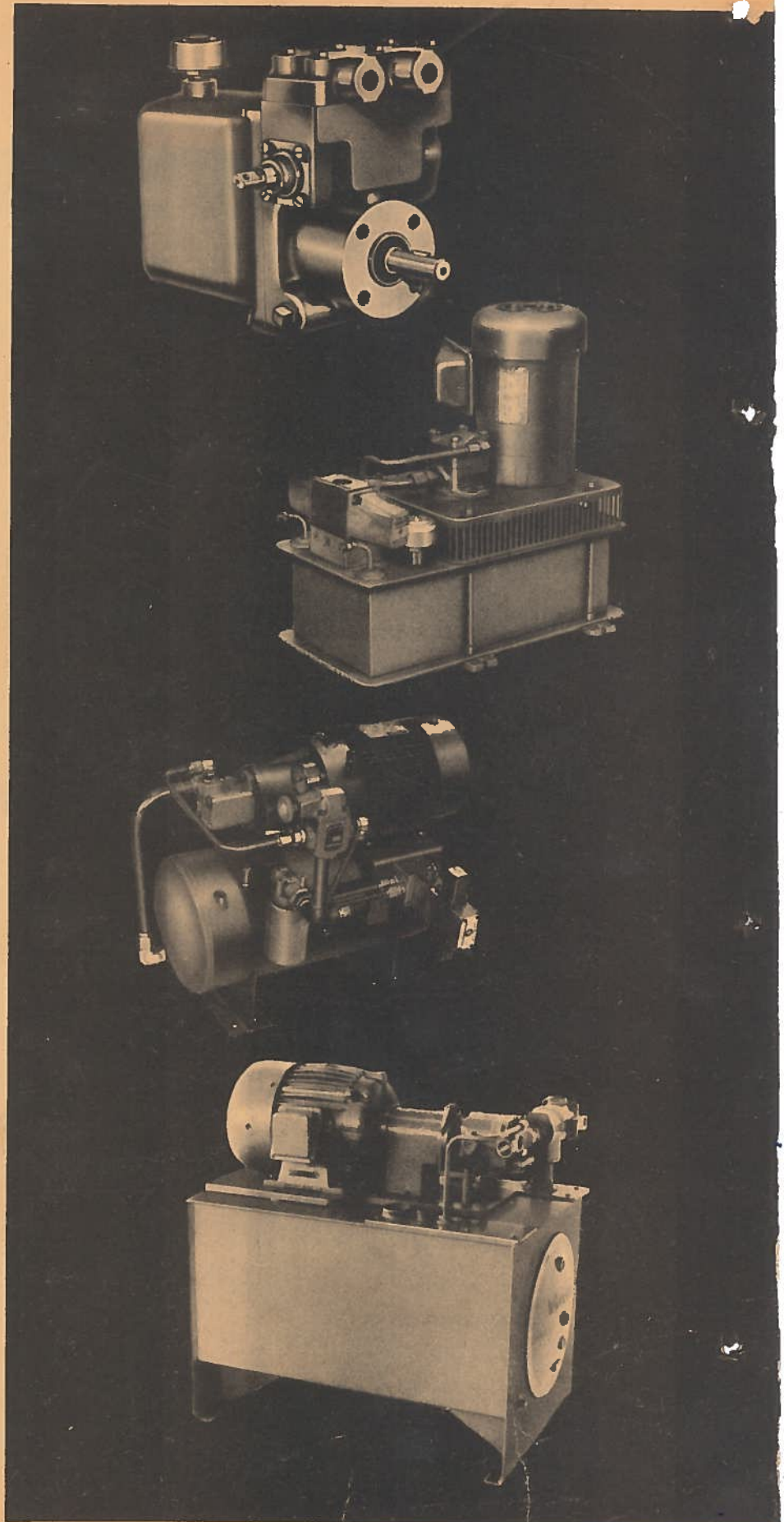
# Standard Power Packages

model PK1 power pack integral design

low-cost vertical-pak

model C-10 inexpensive, compact  
power package

Power packages using Sperry Vickers in-line piston pumps offer exceptionally high operating efficiency at pressures to 3000 psi. Six power package sizes are available.





# Quiet Hydraulics

Today, buyers are demanding quiet machines because of their concern about meeting OSHA noise limits. Sperry Vickers is helping to meet this demand by supplying quiet hydraulic components. Sound levels of some pumps today, for example, are fifty percent lower than the same model pumps of a few years ago.

**SOUND ADVICE**—Producing quiet, hydraulically-actuated machines requires more than just the use of quiet components.

Meeting the stringent sound-level specifications of today's industrial hydraulic systems and machines takes careful engineering. The pump should be considered first. It not only produces sound directly but generates vibrations and fluid pulsations. These react with other machine parts which produce more sound.

**PUMP SELECTION**—Pumps generate more acoustic energy per unit by hydraulic power running at high speed than at low. For this reason, a pump should operate at 1200 rpm whenever sound is critical. Below 3000 psi, the trade-off between pressure and pump size for a given horsepower has little effect on noise, so you are free to select any combination of these factors that otherwise meet your needs.

**MECHANICAL ISOLATION**—To meet lower sound level limits, the pump should be mechanically isolated from the rest of the machine using vibration mounts. This also requires that all connections to the pump be made with flexible hose.

Flexible hose will often reduce noise even where vibration mounts are not used. It prevents vibrations from reaching other lines and components to keep them from becoming sound sources. In long lengths, this hose is, itself, a good sound generator so only short lengths should be used. For long runs, use solid line with short hoses at the ends. All long lines must be supported every few feet, preferably with clamps providing vibration damping. Lines must not contact panels that are good sounding boards. Where they pass through such panels, allow sufficient clearance to prevent direct contact; never use bulkhead fittings in such cases.

**ACOUSTIC ISOLATION**—The greatest sound level reductions are attained with the pump acoustically as well as mechanically isolated. This requires that the pump be completely enclosed in a non-porous shell weighing at least two pounds per square foot of surface. No openings can be tolerated and all joints must be sealed with resilient gaskets or moldings. Grommets of rubber or other soft materials should be used to

close openings around piping and to prevent mechanical contact between the enclosure and piping. It must be emphasized that while mechanical isolation by itself can reduce noise, acoustic isolation can only be effective when used in combination with mechanical isolation.

**FLUIDS**—The condition of the fluid being pumped is also important in controlling sound. Fluid viscosity, temperature and vacuum by themselves have no effect on sound levels. It's important to control them, however, to prevent the formation of entrained air or vapor bubbles that can double sound levels, and reduce pump life.

A combination of high fluid temperature and inlet vacuum generate what are called cavitation bubbles. However, at low temperatures, a high viscosity fluid in a very long suction line can also produce sufficient vacuum to cause cavitation. Important methods of suppressing bubble formation include: Using short runs or large diameter inlet lines; keeping the reservoir elevation close to or above that of the pump; using low drop inlet filters that signal when they are producing high vacuums and need changing; and, providing adequate fluid controls. These are all good hydraulic practices that become increasingly important where you must achieve low sound levels.

**RESERVOIRS**—Reservoirs provide the means for releasing entrained bubbles. These can come from sources other than the pump inlet and are usually present in the fluid returning to the reservoir. It is important to note that low reservoir temperatures reduce the rate of bubble escape and may result in incomplete release. As pointed out earlier, high temperatures promote bubble formation. The best balance between these two alternatives is achieved by maintaining the temperature of oil leaving the reservoir in the range of 120° to 150° F. and the temperature of water-based fluids between 100° and 120° F.

A simple reservoir has to be large to affect complete bubble release. By providing baffles to guide the fluid through a circuitous path and by locating return and pump inlet lines as far apart as possible, a reservoir holding between two to three minutes of maximum pump flow can be adequate.

This briefly covers some noise-control practices that may help you design quiet machines. A more comprehensive coverage of this subject is given in the booklet, "More Sound Advice." You can get a copy of this publication through your Sperry Vickers sales office or by writing directly to Sperry Vickers, 1401 Crooks Road, Troy, Michigan 48084.



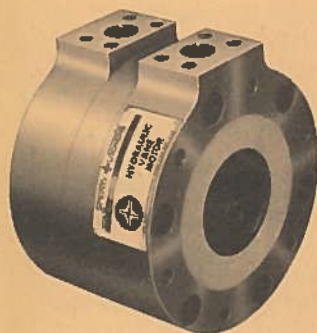
**g****control assemblies**

- deceleration
- single and dual feed, or tri-speed

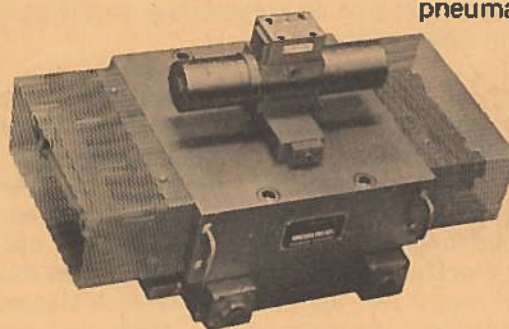
**h****servo valves and systems**

- electro hydraulic control
- building block concept

**... for complete hydraulic equipment and service**

**i****hydraulic motors**

- balanced vane
- fixed and variable displacement angle piston
- fixed and variable displacement in-line piston

**j****salem valves**

- hydraulic and pneumatic valves

**k****accessories**

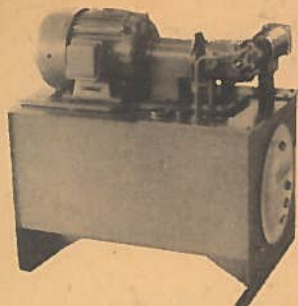
- oil coolers
- accumulators
- oil filters

**modular valves and accessories**

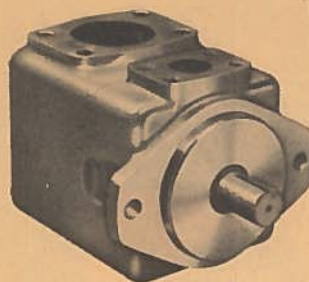
<u>type</u>	<u>page</u>
• relief	d-16 & d-18
• sequence	d-50 & d-52
• reducing	d-68 & d-70
• flow control	e-3 & e-4
• miniature & accessories	f-65 — f-73
• check	f-139 & f-141

**a****power packages**

- standard reservoirs
- custom power packages
- motor mounted pump assemblies

**b****vane and gear pumps**

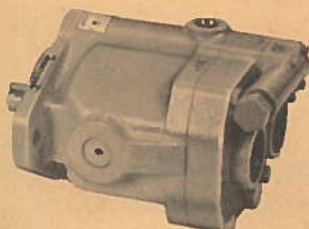
- single
- double
- combinations



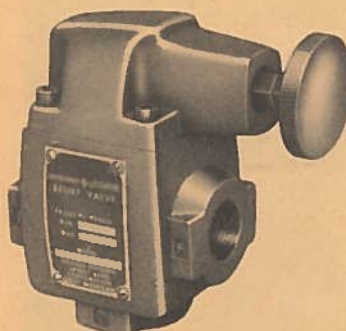
**SPERRY VICKERS**  
POWER AND MOTION  
CONTROL SYSTEMS

**... THE SINGLE SOURCE****c****piston pumps**

- fixed displacement
- variable displacement
- in-line
- angle

**d****pressure controls**

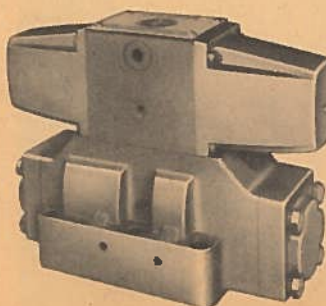
- relief
- counterbalance
- sequence
- unloading
- reducing

**e****flow controls**

- flow control
- flow control and check
- flow control and overload

**f****directional controls**

- solenoid
- solenoid/pilot
- pilot
- manual
- mechanical
- deceleration valves
- check valves

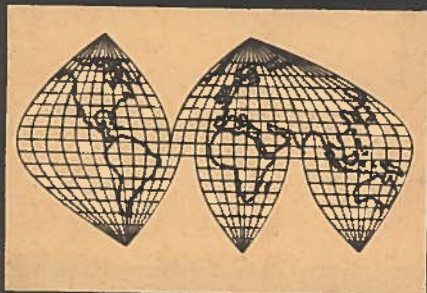




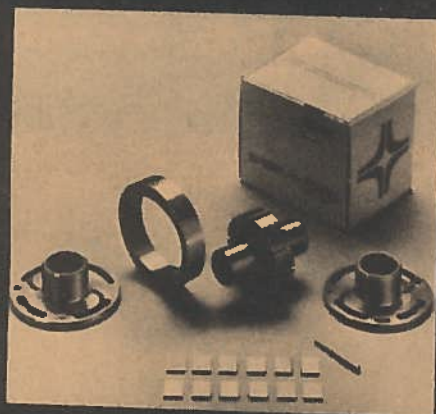


**TECHNICAL SERVICES AND LITERATURE**—Brochures, manuals and other types of technical literature covering a broad scope of helpful hydraulic information is available without obligation to Sperry Vickers customers.

Hydraulic conferences and forums, as well as other technical meetings, are held regularly to promote a better understanding of hydraulics and its use in specific types of equipment.



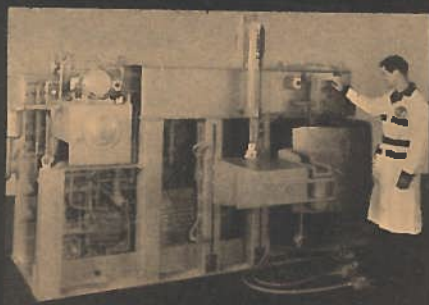
**EXPORT REPRESENTATION**—You can export and/or operate Sperry Vickers equipped products anywhere with assurance that interchangeable parts and service are immediately available. Sperry Vickers service and engineering offices are maintained in principal cities throughout the free world.



**SERVICE KITS**—Sperry Vickers component service kits are designed to simplify repairs, minimize downtime, add convenience to maintenance and inventory stocking, and produce overall savings in repairs and parts costs. For example, the vane-type pump service kit contains a complete pumping cartridge, all necessary gaskets, seals, etc. in a package. The kit permits restoration of the pump to new pump efficiency in ten to fifteen minutes.



**WAREHOUSE STOCK**—Immediate availability of replacement parts can always be expected from Sperry Vickers. Warehouses and distributors are well stocked and are strategically located all over the world.



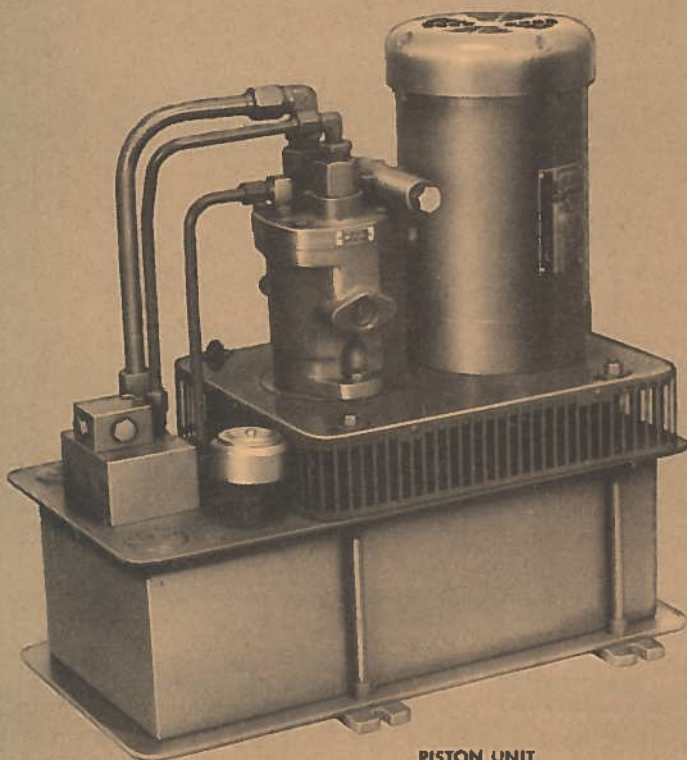
**FIELD SERVICE REPRESENTATIVES**—When you have hydraulic problems, Sperry Vickers field representatives are ready and willing to offer their assistance to you. These men are factory-trained and experienced hydraulic specialists.



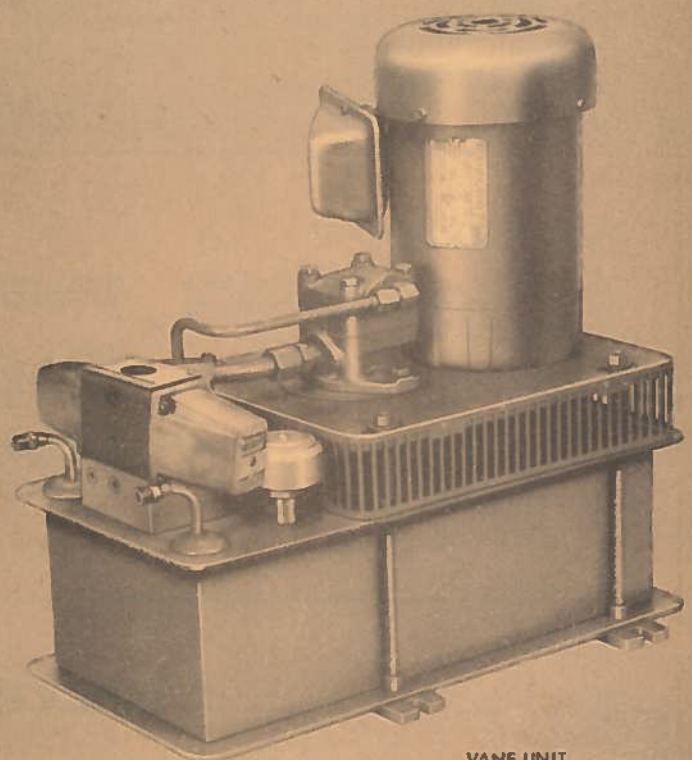
# NEW, LOW-COST VERTICAL-PAK

SPERRY  VICKERS

- Compact "VERTICAL-PAK" saves space.
- Attractively priced.
- Cool and quiet operation.
- Four-gallon reservoir, 2-3 hp rating.
- Choice of vane or variable piston pump.
- Flow output 2-6 gpm, 2000 psi maximum pressure.
- Adaptable to broad range of hydraulic valves.
- Optional pressure gage and pop-in cooling coil.
- Standard components—easy service.



PISTON UNIT



VANE UNIT



# Sperry Vickers VERTICAL-PAK

## Electric Motor and Hydraulic Pump

### Attractively-priced, compact, quality-built.

A new concept in low-cost power packages, Sperry Vickers Vertical-Pak consists of a vertically mounted 2 or 3 horsepower electric motor and either a constant or a variable delivery pump.

The pump is driven by means of a timing belt which solves critical alignment problems.

### Easy to service.

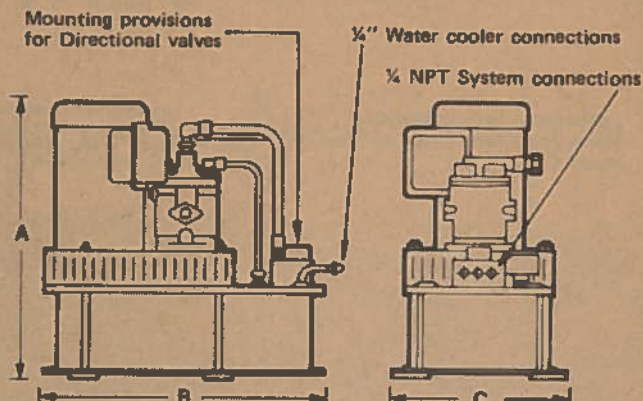
Unlike many other vertically-mounted electric motor and pump designs, the pump is *not* submerged. This makes it easy to reach the pressure and volume adjustments on the variable volume pumps. The pumps can be serviced without major disassembly of the package.

### Superior heat rejection.

A unique baffling arrangement, combined with circulating air blown downward over the unit from the electric motor, gives superior heat rejection characteristics. An optional pop-in water cooling coil is available for unusual applications requiring additional cooling.

### Wide range of applications.

Vertical-Paks are ideally suited for machine tool control systems, electrical discharge machines, refuse compactors, tensile test machines, bearing cooling and lubrication systems, paper machinery, edge-guide controls, feed packages, laboratory machinery, and many other applications where space and cost are major considerations.



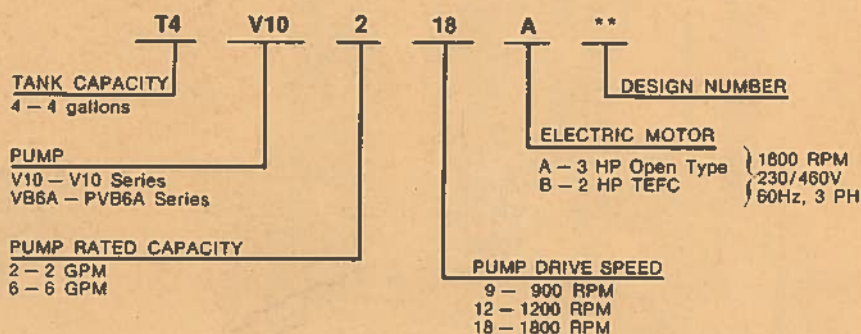
Model	A	B	C
T4-V10-10	21	21	12 3/4
T4-VB6C-10			

### Options:

- Manifold for Vickers DG4S4 Valve Series
- Motor — 2 HP @ 1800 RPM TEFC
- Pop-in cooling coil
- Pressure gage

### How to Order

To order the Vertical-Pak desired for a particular application, it should be specified as follows:



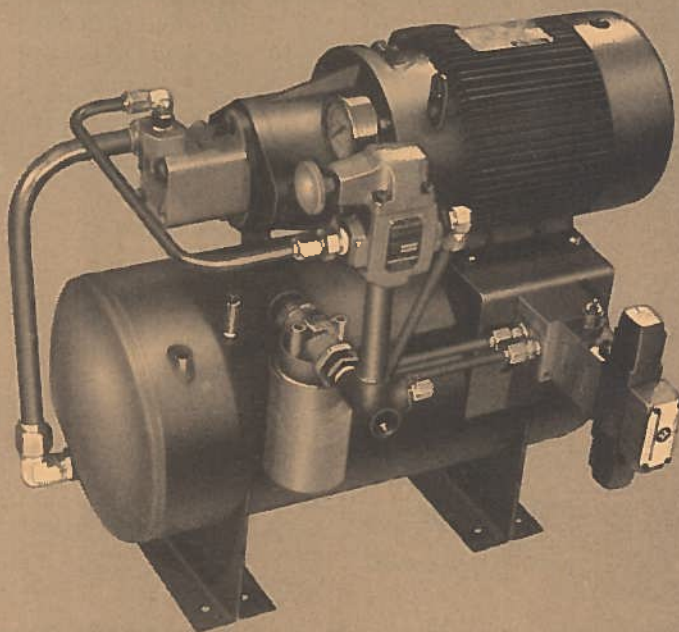
**SPERRY VICKERS**

Measure the value of a supplier by all he supplies above and beyond a quality product. Sperry Vickers measures up.

# **NEW, INEXPENSIVE “C-10” HYDRAULIC POWER PACKAGE**

## **Features and Benefits**

- Compact, lightweight, space saving power package
- Big performance — attractively priced
- Large heat dissipation area — quiet operation
- Choice of vane or variable piston hydraulic pump
- Pump displacements from 1-6 gpm — 5 hp maximum
- Standard components — optional valving
- Available from stock



**VANE UNIT**



# SPERRY VICKERS "C-10" Hydraulic power package

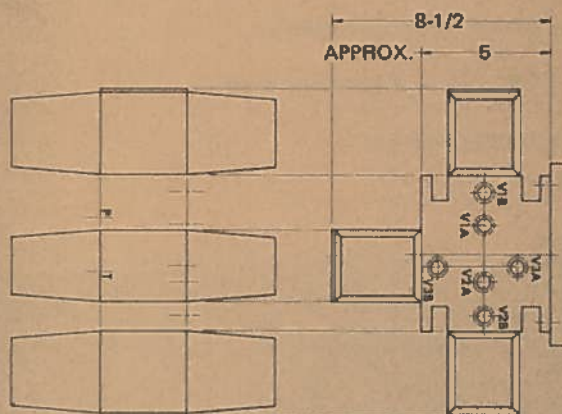
**Inexpensive, compact and quality-built.** A new concept in low-cost power packages, Sperry Vickers new "C-10" power package consists of a motor mounted pump assembled on a ten gallon reservoir. You have a choice of either a fixed displacement vane pump or a variable displacement piston pump.

There are also two series of directional valves available with these power packages; Sperry Vickers new DG4V and the proven DG4S4-01 with all the other associated modular valves.

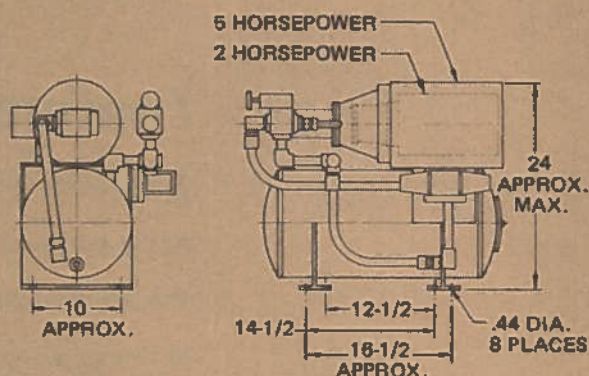
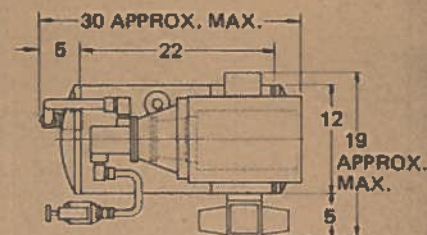
**Easy to service.** Pumps and valves are readily accessible for fast, efficient service.

**Superior heat rejection.** A unique baffling arrangement (combined with utilization of the full surface area of the cylindrical tank) gives a superior heat rejection characteristic.

## Manifold Block (2 & 3 valves)



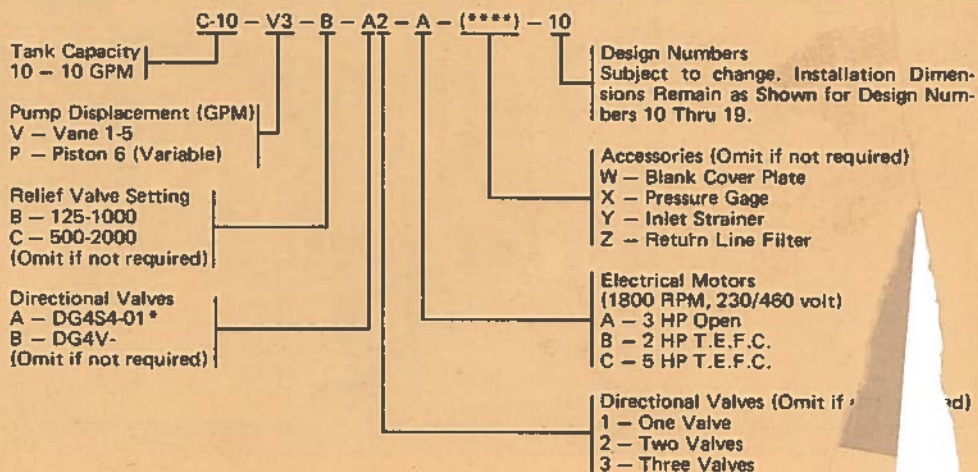
## Dimensions



## Options (STANDARD)

- 1, 2, & 3 valve manifold for Sperry Vickers DG4S4-01 valves
- 1, 2, & 3 valve manifold for Sperry Vickers DG4V valves
- 2, 3, or 5 hp motors @ 1800 rpm, 230/460 volt
- Pressure gage
- Strainers & filters
- Modular valves
- Pumps — vane 1-5 gpm  
— piston 6 gpm (pressure compensated)

## Model Code



**SPERRY VICKERS**

a - 6

LITHO IN U.S.A.

SPERRY VICKERS • DIVISION OF SPERRY RAND CORPORATION  
TROY, MICHIGAN 48064

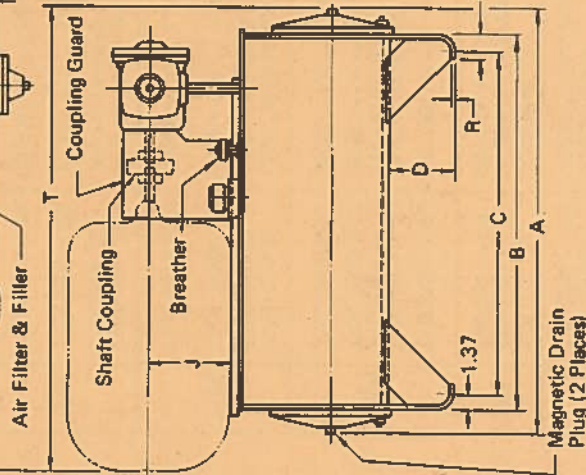
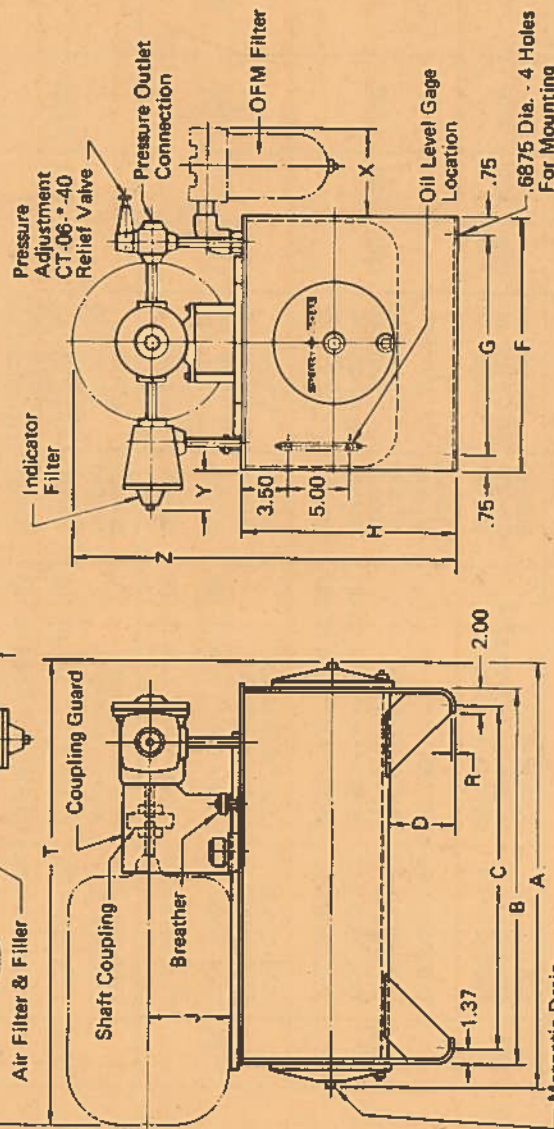
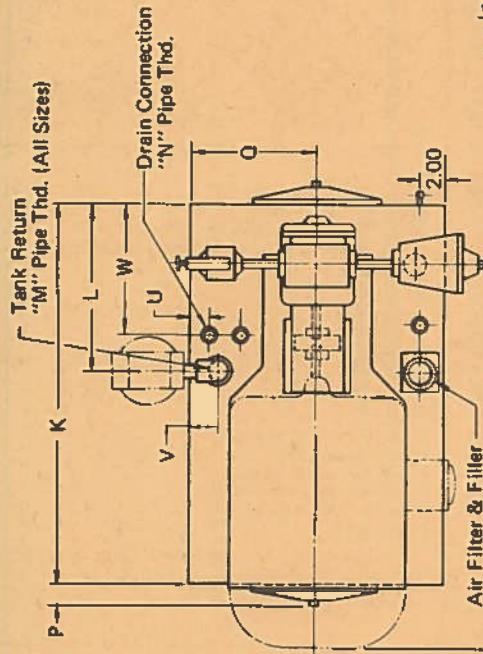
Measure the value of a sup  
above and beyond a quality  
measures up.

supplies  
/ickers

78-196



Tank Return  
"M" Pipe Thd. (All Sizes)



# SPERRY VICKERS HYDRAULIC POWER PACKAGES

MODEL SERIES T10, T20, T60, T100, T150 AND T200  
WITH VANE PUMPS

Note:

Dimensions "J", "T" and "Z" represent the largest pump and electric motor combination for each standard tank size. Dimensions "U", "V", "W", "X", "Y" and "Z" shown on reverse side.)

System Pressure Connections	
CT-06-.40	3/4" NPTF Thd.
CT-10-.20	1-1/4" NPTF Thd.
VC-108-.6	3/4" NPTF Thd.
VC-138-.6	1-1/4" NPTF Thd.

For additional information on Sperry Vickers filters, please request Bulletin 78-198.

## Standard Equipment:

Shaft Coupling Guard  
Air Breather  
Air Breather and Filler Cap Assembly  
Magnetic Drain Plugs  
Motor and Pump Mounting Plate  
Oil Level Gage

Note:

It is recommended that the tank capacity in gallons be approximately double the pump delivery in GPM. Deviation from this is permitted when adequate precautions are taken to insure that aerated fluid is not being pulled into the pump inlet connection. At low fluid level aeration problems are worst.

● Weight shown is less pump, valve, filters and electric motor.

Power Package Size	Tank Capacity Level - Gallons		A	B	C	D	F	G	H	J	K	L	M	N	P	Q	R	T	Wt. Lbs. (Approx.)
	High	Low																	
T10	10	5.5	27.5	23.0	20.25	6.00	16.00	14.50	18.00	5.25	24.00	9.00	1.00	.37	1.75	8.00	.14	31.25	125
T20	20	12	35.5	31.0	28.25	6.00	21.00	19.50	18.00	7.00	32.00	14.00	2.00	.50	1.75	10.50	.14	37.00	225
T60	60	33	42.5	37.0	34.25	6.00	25.00	23.50	25.00	9.00	38.00	14.00	2.00	.50	2.50	12.50	.19	46.00	350
T100	100	60	51.5	46.0	43.25	6.00	30.00	28.50	29.00	10.00	47.00	16.00	2.00	.50	2.50	15.00	.19	52.00	450
T150	150	-	68.0	61.0	58.25	6.00	30.00	28.50	29.00	10.00	62.00	25.00	2.00	.50	2.50	15.00	.19	54.00	650
T200	200	-	78.0	71.0	68.25	6.00	36.00	34.50	29.00	10.00	72.00	27.00	2.00	.50	2.50	18.00	.25	54.00	775

REVISED 12-1-78

SPERRY VICKERS  
TROY, MICHIGAN 48064

HYDRAULIC  
POWER PACKAGES

MODEL SERIES  
T10, T20, T60,  
T100, T150 AND T200

VANE  
TYPE PUMPS

WITH  
SPERRY VICKERS  
INDICATING FILTER

DWG. NO.  
5008000

5008000

SEC.  
a



Tank Size	Tank Model Number	Pump Model Number	Pump Inst. Drwg.	Relief Valve @ 1200 RPM	U	V	W	Accessory Overhang Dimensions - Approx. OFM-101 Filter Dim. X	Indicating Filter Y	Max. Motor @ 1200 RPM Frame Size (NEMA)	Max. Overall Height Tank and Motor Z
T10	T10-V10-22	V10-2P-P-1A	502000	CT-06-40	1.75	1.75	11.75	4.5	4.00	215	31.00
	T10-04-22	V10-4-10	501900	CT-06-40							
	T10-V20-22	V20-2P-S-1A	502200	CT-06-40							
T20	T20-04-22	V10-4-10	501900	CT-06-40							
	T20-V10-22	V10-2P-P-1A	502000	CT-06-40	2.5	2.25	11.00	4.5	4.00	256	33.65
	T20-V20-22	V20-2P-S-1A	502200	CT-06-40							
	T20-2234-22	V2234-1A-20-S214	I-248700	(2) CT-06-40					6.00	256	
T60	T60-V20-22	V20-2P-S-1A	502200	CT-06-40	1.50	2.50	11.00	4.5	6.00	326	45.00
	T60-2234-22	V2234-1A-20-S214	I-248700	(2) CT-06-40							
	T60-25V-22	25V-A-1A-10-181	502500	CT-06-40							
T100	T100-138-22	VC-138-5	501960 & 501970	.....					5.00	365	
	T100-25V-22	25V-A-1A-10-181	502500	CT-06-40					5.00	365	
	T100-35V-22	35V-A-1A-10-181	502800	CT-10-40	1.50	2.50	13.00	6.0	4.00	404	53.00
	T100-2520V-22	2520V-A-1AA-10-181	504000	(2) CT-06-40					4.00	365	
	T100-3520V-22	3520V-A-1AA-10-181	504300	CT-06-40 & CT-10-20					5.00	404	
T150	T150-45V-22	45V-A-1A-12-181	503000	CT-10-20					4.00		
	T150-35V-22	35V-A-1A-10-181	502800	CT-10-20					5.00		
	T150-3520V-22	3520V-A-1AA-10-181	504300	(1) CT-06-40	1.50	2.50	20.50	6.0	5.00	404	53.00
	T150-4520V-22	4520V-A-1AA-12-181	504600	(1) CT-10-20					7.50		
T200	T200-45V-22	45V-A-1A-12-181	503000	CT-10-20							
	T200-35V-22	35V-A-1A-10-181	502800	CT-10-20							
	T200-3520V-22	3520V-A-1AA-10-181	504300	(1) CT-06-40	1.50	2.50	22.50	6.0	5.00	404	53.00
	T200-3525V-22	3525V-A-1AA-10-181	504500	(1) CT-10-20							

\*\*\*\*\* Relief Valve Integral With Pump

The above chart provides approximate overhang dimensions when Sperry Vickers indicating inlet filters and/or Sperry Vickers return line (OFM) filters are specified.  
 ■ T and U Frame Electric Motors Used.

# SPERRY-VICKERS HYDRAULIC POWER PACKAGES

## MODEL SERIES T10, T20, T60, T100, T150 AND T200 WITH VANE PUMPS

### General Data

These units are self-contained power sources for use as main hydraulic systems, or for such auxiliary applications as: clamping, chucking, clutch operation, transferring, rollover, elevating, indexing, etc.

Units should be installed to allow for free circulation of air around the tank at all times. For information pertaining to heat rejection characteristics, see chart below.

### Maximum Operating Temperature

Refer to data sheet 1-286-S for hydraulic fluid and temperature recommendations.

### Maximum Operating Pressure

See applicable pump installation drawing.

### Fire-Resistant Fluids

Power packages using fire-resistant fluids have unpainted tank interior and special exterior paint. Special seals may be required. Identification of these power packages is by an "F" prefix as follows:

F3 - Synthetic Fire-Resistant Fluid

**Caution:** The rating of certain pumps is reduced when operated with fire-resistant fluids; other pumps can only be used with specific types of fire-resistant fluids, for recommended fluid information, see applicable pump installation drawing. This also applies to the valves and filters.

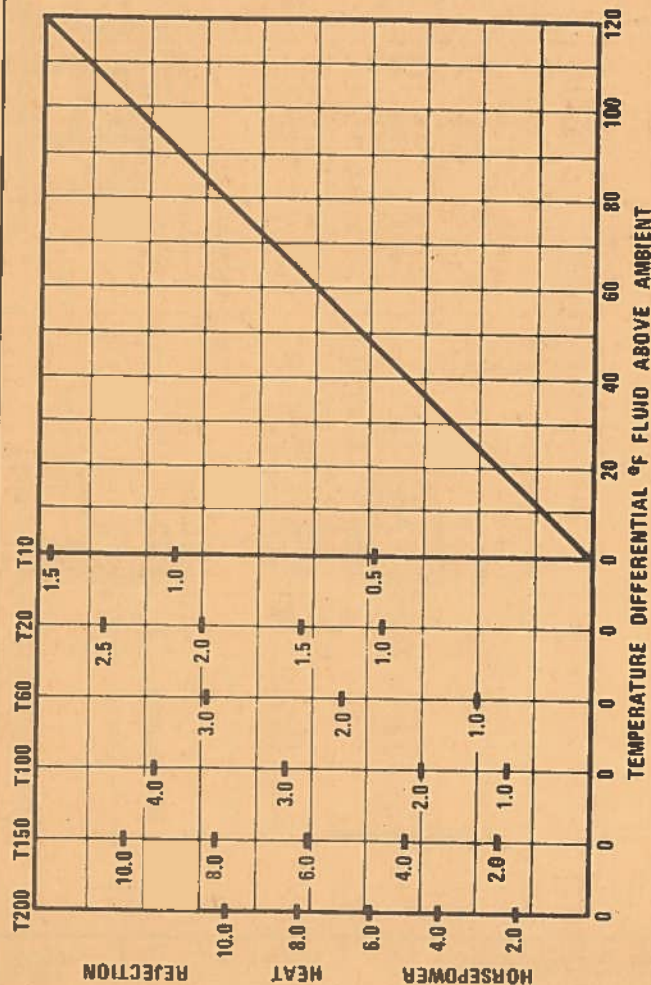
### Ordering

The following items should be specified when ordering.

- Tank Size
- Pump Model Number
- Type Of Fluid To Be Used
- Relief Valve(s) Model Number
- Electric Motor Characteristics
- Sperry Vickers or customer to furnish or mount motor, filter and fluid level indicator options

### Example of Power Package Numbering

F1-T60-04-\*\*-22 Asterisks denote space to add any or all of the following available options:  
 G - Return line by-pass filter (OFM). (Inst. Dwg. 522100)  
 H - "Indicator" inlet filters (Standard unless requested to omit). (Inst. Dwg. 522150)  
 L - Fluid level indicators on both sides or ends of tank.  
 M - Magnet



### Heat Dissipation Capabilities T10, T20, T60, T100, T150 And T200 Gallon Power Units

Data contained in this chart has been obtained from units operated under normal room conditions. When less than normal circulation is present, heat dissipation will be somewhat less. Dark colored reservoir paint aids heat emission. Avoid aluminum paints.







Tank Size	Tank Model Number	Pump Model Number	Pump Int. Drwg.	Relief Valve	U	V	Accessory Overhang Dimensions - Approx. OFM 101 Dim. "W"	Indicating Filter Dim. "X"	Max. Motor Frame Size (NEMA)	Max. Overall Height Tank and Motor "Y"
T10	T10VB5C-22	PV85-F*SY-20-C	508300B	***** CT-08-40 *****	1.75	11.75	4.5		215	31.00
	T10VB5H-22	PV85-F*DY-20-H	508275A	*****	2.25	11.0	4.5		284	36.00
	T10VB6CA-22	PVB6A-FRS-20-CA-11	508400B	*****	2.50	11.0	4.50	X <sub>1</sub> = 6 X <sub>2</sub> = 4	328	45.00
T20	T20VB5C-22	PV85-F*SY-20-C	508300B	*****	2.50	13.0	6.00	5.00	365	51.00
	T20VB10C-22	PVB10-FSY-30-C	508400B	*****	2.50	20.50	6.00	5.00	365	51.00
	T20VB15C-22	PVB15-FSY-30-CM	508400B	*****	2.50	20.50	6.00	2.00	365	51.00
T60	T60VB20C-22	PVB20-FSF-20-C	508500C	*****	2.50	20.50	6.00	2.00	365	51.00
	T60VB29C-22	PVB29-FSF-20-CM	508890	*****	2.50	20.50	6.00	2.00	365	51.00
	T100VB820C-22	PVB20-F*SF-20-C	508500C	*****	2.50	20.50	6.00	2.00	365	51.00
T100	T100VB29C-22	PVB29-FSF-20-CM	508890	*****	2.50	20.50	6.00	2.00	365	51.00
	T100VB45C-22	PVB45-FSF-20-C	508890	*****	2.50	20.50	6.00	2.00	365	51.00
	T100VB45A-22	PVB45A-FSF-10-CA	508890	*****	2.50	20.50	6.00	2.00	365	51.00
T150	T150VB29C-22	PVB29-FSF-20-CM	508500C	*****	2.50	20.50	6.00	2.00	365	51.00
	T150VB45C-22	PVB45-FSF-20-C	508890	*****	2.50	20.50	6.00	2.00	365	51.00
	T200VB29C-22	PVB29-FSF-20-CM	508500C	*****	2.50	20.50	6.00	2.00	365	51.00
T200	T200VB45C-22	PVB45-FSF-20-C	508890	*****	2.50	20.50	6.00	2.00	365	51.00
	T200VB45C-22	PVB45-FSF-20-C	508890	*****	2.50	20.50	6.00	2.00	365	51.00

The above chart provides approximate overhang dimensions when Sperry Vickers indicating suction and/or (OFM) return line filters are specified.

■ T and U Frame Electric Motors used.

#### Summary Chart

Pump Size	Drive Speed	Min. Circuit Volume (Cu. In.) Below Which Relief Valve Is Recommended At Compensator Pressure Shown. ▲			
		1000 PSI	2000 PSI	3000 PSI	3000 PSI
5, 6, 10, 15	1200/1800	0	0	0	0
20	1200	100	200	300	300
	1800	200	300	400	400
29	1200	200	300	300	300
	1800	300	400	400	400
45 & Larger	1200/1800	Relief Valve Always Recommended			

▲ Values may be reduced by 100 if a 51 design DG valve is used.

218807  
JEF



# HYDRAULIC POWER PACKAGES

MODEL SERIES T10, T20, T60, T100, T150 AND T200  
WITH PISTON PUMPS

## General Data

These units are self-contained power sources for use as main hydraulic systems, or for such auxiliary applications as: clamping, chucking, clutch operation, transferring, rollover, elevating, indexing, etc.

Units should be installed to allow for free circulation of air around the tank at all times. For information pertaining to heat rejection characteristics, see chart below.

## Maximum Operating Temperature

Refer to data sheet I-286-S for hydraulic fluid and temperature recommendations.

## Maximum Operating Pressure

See applicable pump installation drawing.

## Fire Resistant Fluids

Power packages using fire-resistant fluids have unpainted tank interior and special exterior paint. Special seals may be required. Identification of these power packages is by an "F" prefix as follows:

F3 — Synthetic fire-resistant fluid

**Caution:** The rating of certain pumps is reduced when operated with fire-resistant fluids; other pumps can only be used with specific types of fire-resistant fluids, for recommended fluid information, see applicable pump installation drawing. This also applies to the valves and filters.

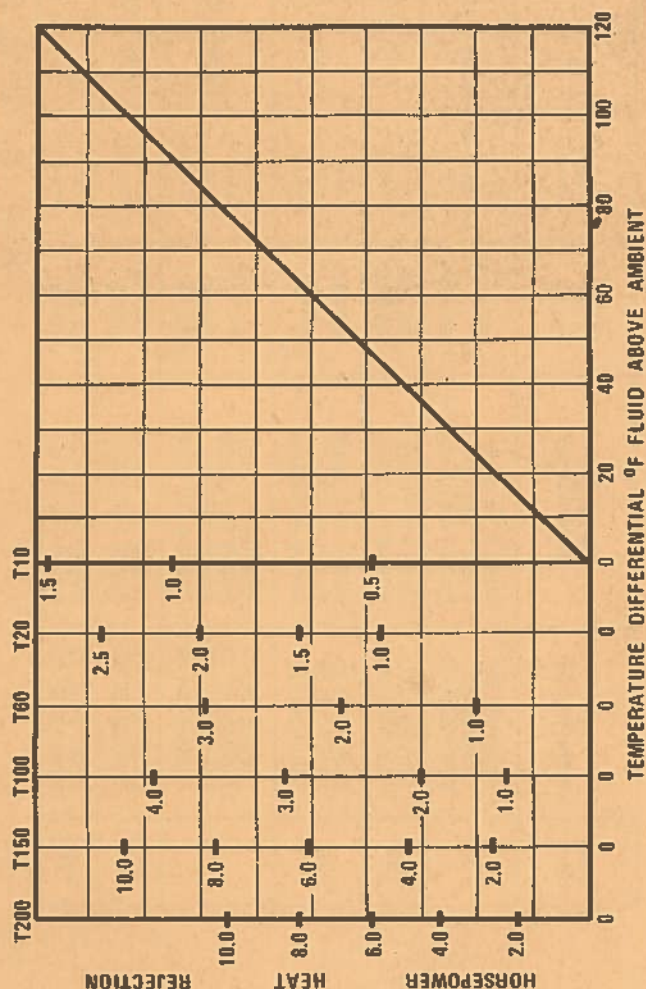
## Ordering

The following items should be specified when ordering:

- Tank Size
- Pump Model Number
- Type of Fluid To Be Used
- Electric Motor Characteristics
- Sperry Vickers or customer to furnish or mount motor, filter and fluid level indicator options

## Example of Power Package Numbering

F1-T20-PVB10-30-\*22 Asterisks denote space to add any or all of the following available options:  
G — Return line by-pass filter (OFM); Not available for emulsion fluids. (Inst. Dwg. 522100)  
H — "Indicator" inlet filters (Standard unless requested to omit). (Inst. Dwg. 522150)  
L — Fluid level indicators on both sides or ends of tank.  
M — Magnets



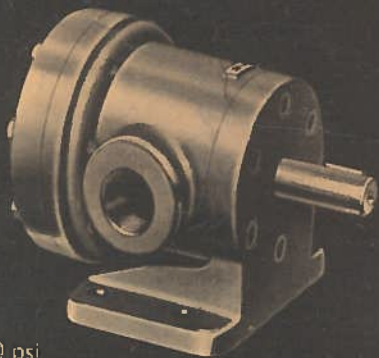
## Heat Dissipation Capabilities T10, T20, T60, T100, T150 and T200 Gallon Power Units

Data contained in this chart has been obtained from units operated under normal room conditions. When less than normal circulation is present, heat dissipation will be somewhat less. Dark colored reservoir paint aids heat emission. Avoid aluminum paints.

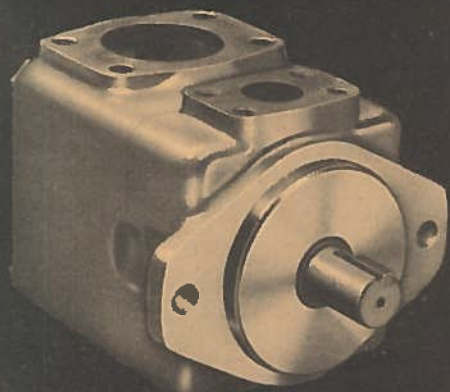
# VANE AND GEAR PUMPS

Customized performance on every application is assured by the most complete line of standard fluid power pumps ever offered to industry. There is no need to compromise on performance — your choice of pump is backed by more than 55 years of Sperry Vickers know-how — assuring that you get the exact pump needed for the job. Four separate design series enable you to pick precisely the best pump for the job. They include single, double and combination pumps . . .

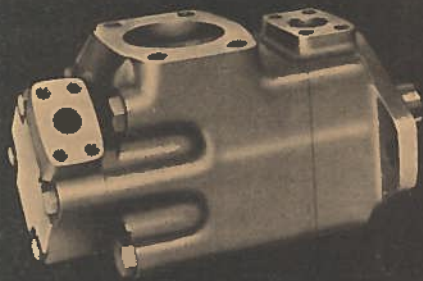




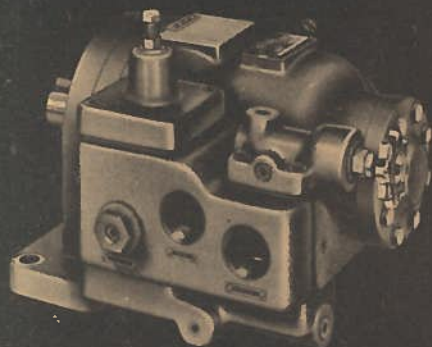
1000 psi  
single vane pump



2500 psi  
single vane pump



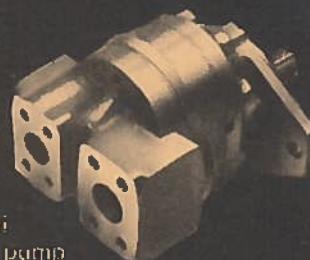
2500 psi  
double vane pump



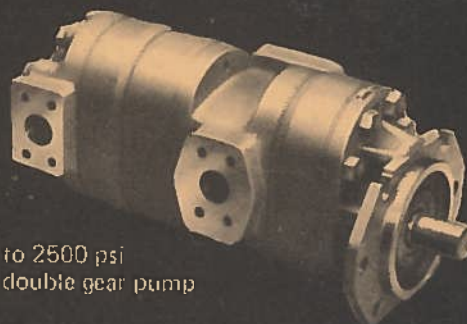
1000 psi  
combination vane pump

## HIGH PERFORMANCE SERIES

For a combination of maximum horsepower in a small package, high efficiency, serviceability and economy Sperry Vickers "high output" pumps have no peer anywhere in industry. Thousands of applications have proved their ability to deliver top performance since they were put into quantity production.



to 2500 psi  
single gear pump

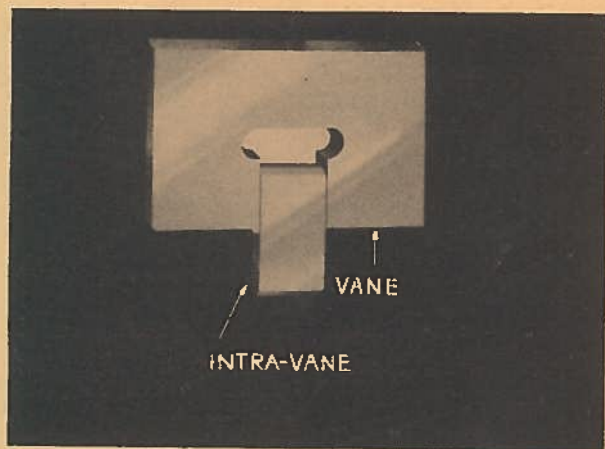


to 2500 psi  
double gear pump



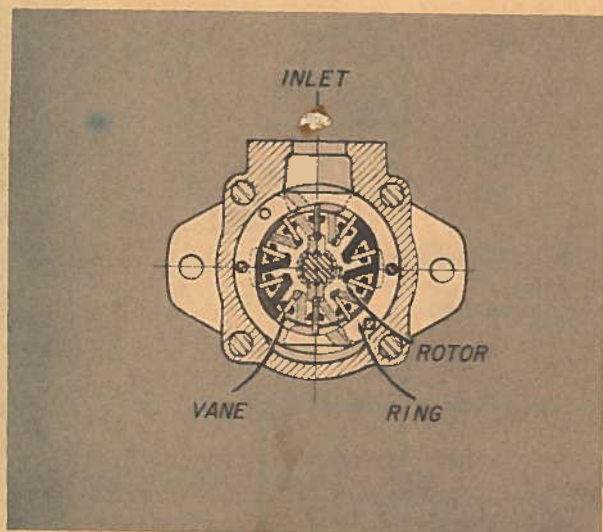
## REPLACEABLE PUMPING CARTRIDGE

The replaceable pumping cartridge contains all parts that wear . . . none contact the body. Field service can be accomplished without removing the pump from its mounting. Replacement cartridge kits are available and pumps need not be sent to factory for repairs.



## INTRA-VANE DESIGN

Because pump outlet pressure is applied continuously to space between vane and intra-vane, tip loading can be reduced to the extent desired on a particular pump. Outward unbalanced thrust of vane in inlet port area is equal to outlet pressure times projected area of end of the intra-vane. This thrust can be controlled without sacrificing vane thickness. To resist the cantilever loads of any practical outlet pressure, vane thickness can be increased without materially increasing load between vane and ring. Vane thrust is about 25% of corresponding conventional Sperry Vickers vane pumps.



## HYDRAULIC BALANCE

With hydraulic balance, bearing loads resulting from pressure are eliminated and the only radial loads are those imposed by the drive itself. Longer life and minimum maintenance are direct results. Wear compensation is inherent in the design. Cross sectional view shows this design principle. Lighter area is inlet, darker shaded area is the outlet . . . rotation is clockwise. Communication holes in rotor direct pressure from spaces behind vanes to their bottom edges. Outside edges of vanes are machined to a bevel, holding them in continuous hydraulic balance except for the pre-selected area of the intra-vane ends. Controlled unbalance occurs only in the inlet port area, complete hydraulic balance is restored in outlet port areas.



**INDEX**  
**SECTION B - VANE AND GEAR PUMPS**

DESCRIPTION		NOMINAL GPM 1200 RPM	DWG. NO.	PAGE NO.
<b>"Round" Vane Pumps</b>				
V104/105	single	1 to 10	501900	b - 1
V124/125	single	14 to 35	133744	b - 3
V108/109	double	2 to 20	136638	b - 5
V128/129	double	15 to 45	135250	b - 7
<b>"Combination" Vane Pumps</b>				
VC108/109	"3" combination	2 to 20	501940	b - 9
VC108/109	"6" combination	2 to 20	501950	b - 11
VC128/129	"3" combination	15 to 45	501960	b - 13
VC128/129	"6" combination	15 to 45	501970	b - 15
VC schematic diagrams			211-S	b - 17
<b>V100 &amp; V200 Vane Pumps S214 Series</b>				
V100	single	1 to 3	236587	b - 18
V200	single	2 to 10	502100	b - 20
V2200	double	4 to 22	248700	b - 22
<b>V10 &amp; V20 Vane Pumps</b>				
V10	single	1 to 5	502000	b - 24
V20	single	6 to 13	502200	b - 26
V2010	double	8 to 18	503400	b - 28
V2020	double	13 to 24	503500	b - 30
<b>High Performance Intra-Vane Pumps</b>				
25V	single	12 to 21	502500	b - 32
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45V	single	42 to 60	503000	b - 38
50V	single	72 to 109	503200	b - 41
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3520V	double	27 to 59	504300	b - 47
3525V	double	37 to 66	504500	b - 51
4520V	double	44 to 74	504600	b - 55
4525V	double	54 to 81	504800	b - 59
4535V	double	67 to 105	505000	b - 63
<b>High Performance Gear Pumps</b>				
G20-30	single	7 to 27	506000	b - 67
G20-40	single	7 to 27	506100	b - 69
G30-31	single	18 to 50	506200	b - 71
G2020-30	double	7 to 27	506300	b - 73
G3020-31	double	7 to 50	506400	b - 75
G3030-31	double	18 to 50	506500	b - 77

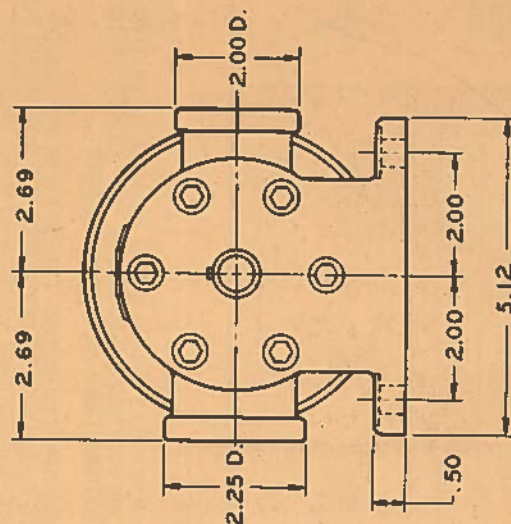
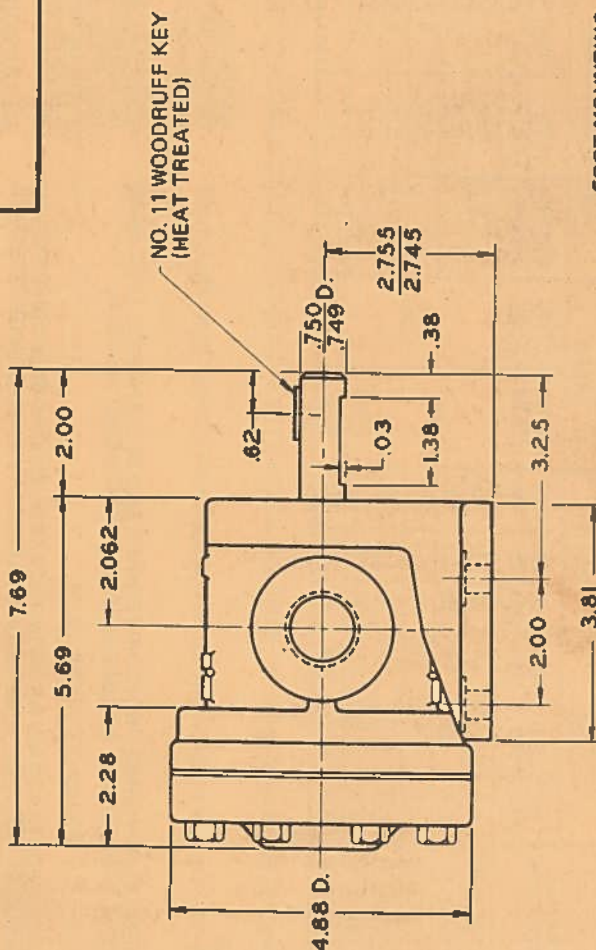
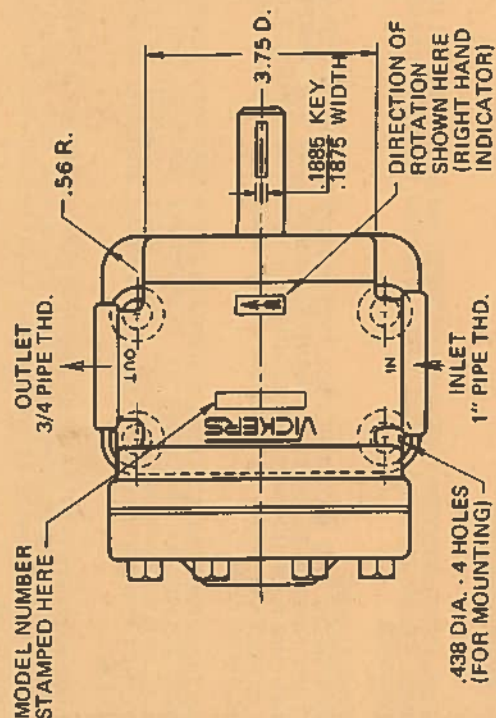
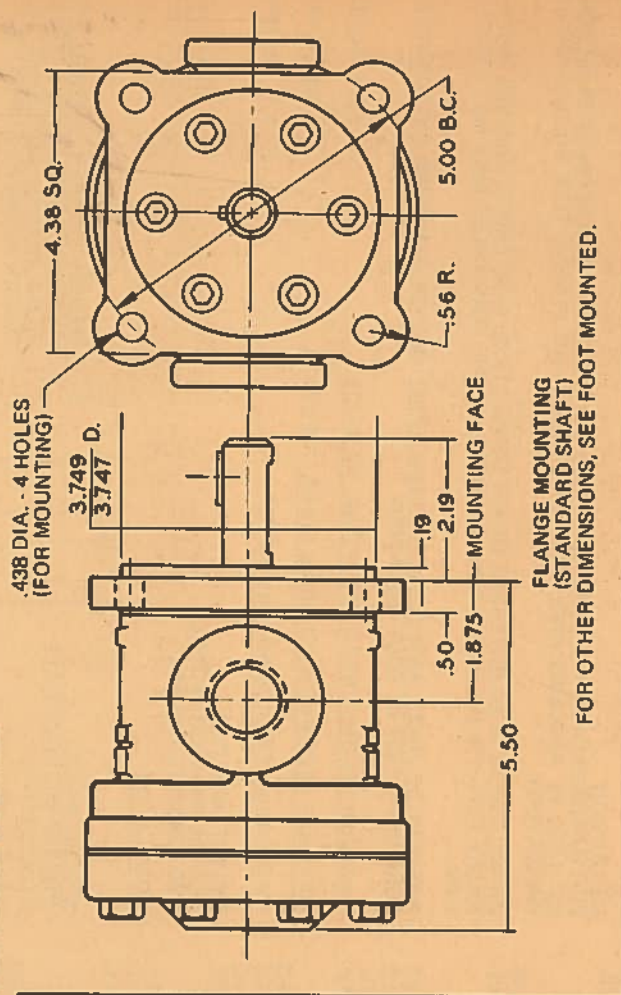
"Relief valve protection is required to limit pump pressure to published ratings. See catalog pressure control section (d). If shock and/or surge pressures exceed the pressure rating by 10%, then other circuit design techniques are required to protect the pump and hydraulic system."

**MODEL CODES**

Model codes in this catalog list many options. Some possible model combinations are not readily available. Please contact your Sperry Vickers representative to verify availability.

# FIXED DISPLACEMENT VANE-TYPE SINGLE PUMPS

MODEL SERIES V-104 AND V-105-2, 10  
FOOT OR FLANGE MOUNTING



FOOT MOUNTING  
(STANDARD SHAFT)

REVISED 9-17-70

501900

VICKERS DIVISION  
OF SPERRY RAND CORPORATION  
TROY, MICHIGAN 48064

VANE TYPE  
SINGLE PUMPS

FIXED  
DISPLACEMENT

1 TO 11 GPM  
DISPLACEMENT

FOOT OR FLANGE  
MOUNTING

DWG. NO.  
501900



MODEL NUMBER		PUMP CHARACTERISTICS AT 1200 RPM BY FLUID TYPE.CHARACTERISTICS AT OTHER DRIVE SPEEDS APPROXIMATELY PROPORTIONAL TO RPM.DATA BASED ON PERFORMANCE AT FLUID TEMPERATURE OF 120° F. VISCOSITY 150 SSU AT 100° F.										MAX. OPERATING PRESSURE			STANDARD GRAPHICAL SYMBOLS FOR FLUID POWER DIAGRAMS	
FOOT MOUNTING	FLANGE MOUNTING	DELIVERY GPM			HP INPUT			MAX. DRIVE SPEED		PUMP FLOW (GPM)			PETROLEUM	SYNTHETIC		WATER GLYCOL
		0 PSI	500 PSI	1000 PSI	0 PSI	500 PSI	1000 PSI	PETRO-LEUM	FIRE RESIS-TANT	PETRO-LEUM	SYN-THETIC	WATER GLYCOL				
V-104-Y-10	V-105-Y-10	1.8	1.5	1.1	.20	.9	1.5	1800	1200	1.8	1.8	1.8	1000	1000	1000	
V-104-E-10	V-105-E-10	2.7	2.4	2.0	.25	1.2	2.2			2.7	2.7	2.7				
V-104-G-10	V-105-G-10	3.7	3.4	3.0	.25	1.4	2.6			3.7	3.7	3.7				
V-104-A-10	V-105-A-10	5.3	5.0	4.7	.30	1.9	3.6			5.3	5.3	5.3				
V-104-C-10	V-105-C-10	8.2	7.9	7.5	.35	2.8	5.2			8.2	8.2	8.2				
V-104-D-10	V-105-D-10	11.5	11.0	10.6	.40	3.7	7.0	1200		11.5	—	—	—	—	—	

18.2 GPM MAY BE OBTAINED WITH "C" PUMP BY LIMITING THE SYNTHETIC FLUID TO A SPECIFIC GRAVITY OF 1.20.

CONSTRUCTION  
SERIES V-104/5-10 PUMPS ARE OF VICKERS "BALANCED VANE TYPE" CONSTRUCTION.

ROTATION  
RIGHT HAND ROTATION VIEWED FROM DRIVESHAFT END IS STANDARD. LEFT HAND ROTATION MAY BE SPECIFIED BY ADDING SUFFIX "LH" TO MODEL NUMBER.

EXAMPLE: V-104-E-10-LH

INLET AND OUTLET PORTS REMAIN AS SHOWN REGARDLESS OF DIRECTION OF SHAFT ROTATION. CHANGE OF INTERNAL ASSEMBLY IS NECESSARY WHEN CHANGE OF DRIVE SHAFT ROTATION IS REQUIRED.

#### FLUIDS

PETROLEUM OIL WITH A VISCOSITY RANGING BETWEEN 150 AND 225 SSU AT 100° F. IS RECOMMENDED. REFER TO DATA SHEET 1-286-S (SECTION L) FOR HYDRAULIC OIL RECOMMENDATIONS.

#### FIRE-RESISTANT FLUIDS

CAUTION: SYNTHETIC AND WATER GLYCOL TYPE FIRE-RESISTANT FLUIDS MAY BE USED, BUT THEY HAVE HIGH SPECIFIC GRAVITIES WHICH LIMIT THE GPM POSSIBLE THROUGH ANY ONE PUMP HOUSING. EXCEEDING THIS LIMIT WILL PRODUCE CAVITATION WITH RESULTANT WEAR AND NOISE. DRIVE SPEED LIMITED TO 1200 RPM. SELECT GPM FROM CHART.

SYNTHETIC FLUIDS: PHOSPHATE ESTERS, PHOSPHATE ESTER BASE AND CHLORINATED HYDROCARBON FLUIDS, AS PRODUCED BY RESPONSIBLE SOURCES FOR RATINGS GIVEN HEREIN, ARE RECOMMENDED. SELECT FLUIDS WITH A VISCOSITY AS CLOSE AS POSSIBLE TO THAT FOR PETROLEUM OIL DESCRIBED ABOVE. SPECIFIC GRAVITY MUST NOT EXCEED 1.42.

PUMPS FOR USE WITH SYNTHETIC FLUIDS REQUIRE SEALS MADE OF DIFFERENT MATERIAL. TO OBTAIN PUMPS EQUIPPED WITH SPECIAL SEALS, ADD PREFIX "F3" TO MODEL NUMBER FOR PHOSPHATE ESTER, PHOSPHATE ESTER BASE AND CHLORINATED HYDROCARBON FLUID.

EXAMPLE: F3-V-104-E-10

WATER GLYCOLS AS PRODUCED BY RESPONSIBLE SOURCES, FOR RATINGS GIVEN HEREIN, ARE RECOMMENDED. SELECT FLUIDS WITH A VISCOSITY AS CLOSE AS POSSIBLE TO THAT FOR PETROLEUM OIL DESCRIBED ABOVE. IT IS RECOMMENDED THAT TEMPERATURES FOR WATER GLYCOLS BE LIMITED TO A MAXIMUM OF 140° F. CONSISTENT WITH THE VISCOSITY RECOMMENDATIONS. STANDARD SEALS MAY BE USED.

WATER-OIL EMULSIONS GENERALLY SHOULD NOT BE USED WITH THESE PUMPS. TO OBTAIN SATISFACTORY SERVICE WITH EMULSIONS, USE VICKERS S214 TYPE PUMPS SHOWN ON INSTALLATION DRAWINGS 1-236587 AND 1-236693.

MAXIMUM SPEED RATINGS ARE GIVEN FOR THREE TYPES OF FLUIDS. SPEEDS ARE INFLUENCED BY SPECIFIC GRAVITY, VISCOSITY AND SUCTION HEAD. PUMP SUCTION AND SPEED SHOULD BE RELATED SO THAT VACUUM AT PUMP INLET DOES NOT EXCEED 5" OF MERCURY FOR PETROLEUM OIL, 3" FOR SYNTHETIC FLUID AND 5" FOR WATER GLYCOL TYPE FLUIDS.

#### FILTRATION

FOR MAXIMUM OVER-ALL EFFICIENCY AND SERVICE LIFE, FILTRATION OF 25 MICRON OR LESS IS RECOMMENDED. FOR FIRE-RESISTANT FLUIDS THIS FILTRATION IS MANDATORY.

DRAIN: THERE IS NO EXTERNAL DRAIN CONNECTION. THE PUMP IS DRAINED INTERNALLY INTO ITS INLET. SYSTEM PRESSURE AT THE PUMP INLET MAY NOT EXCEED 5 PSI.

POSITION OF INLET AND OUTLET CONNECTIONS MAY BE REVERSED BY ROTATING PUMP BODY 180° IN FOOT MOUNTING.

MAXIMUM RECOMMENDED OPERATING PRESSURE, ..... SEE CHART

MAXIMUM RECOMMENDED DRIVE SPEED (APPROX.) ..... SEE CHART

MINIMUM RECOMMENDED DRIVE SPEED ..... 600 RPM

WEIGHT (APPROX.)

FLANGE MOUNTED MODELS ..... 19-1/2 LBS.

FOOT MOUNTED MODELS ..... 21 LBS.

#### MODEL CODE

SPECIAL SEALS  
(OMIT IF NOT REQ'D) SEE  
FLUIDS NOTES

VANE PUMP

SERIES

MOUNTING

4 - FOOT

5 - FLANGE

F3 - V - 10 4 - A - 10

DESIGN NUMBER SUBJECT TO  
CHANGE. INSTALLATION DIMEN-  
SIONS REMAIN AS SHOWN FOR  
DESIGN NUMBERS 10 THRU 19.

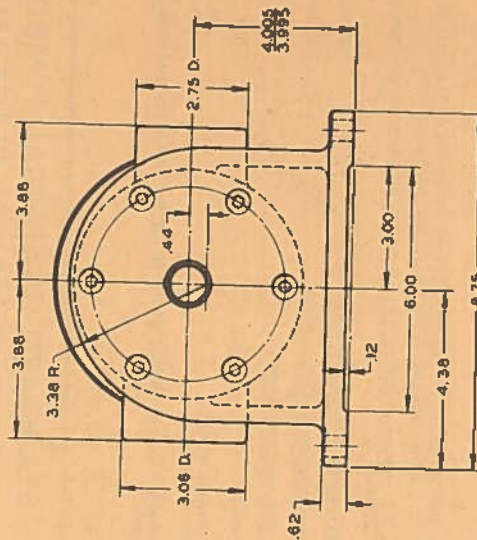
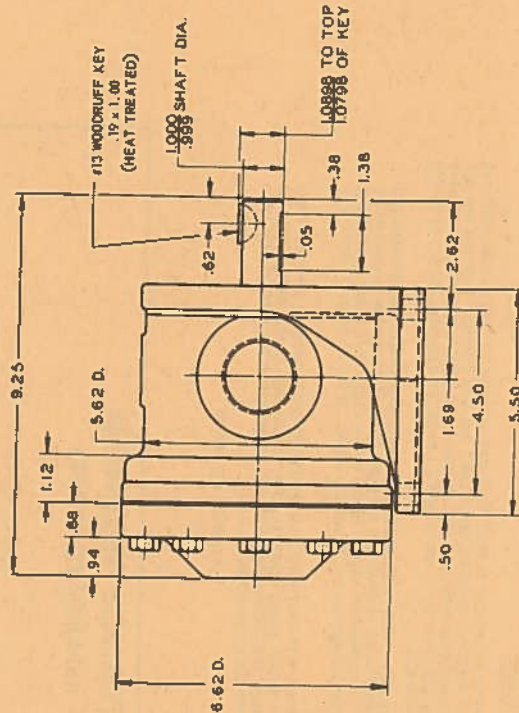
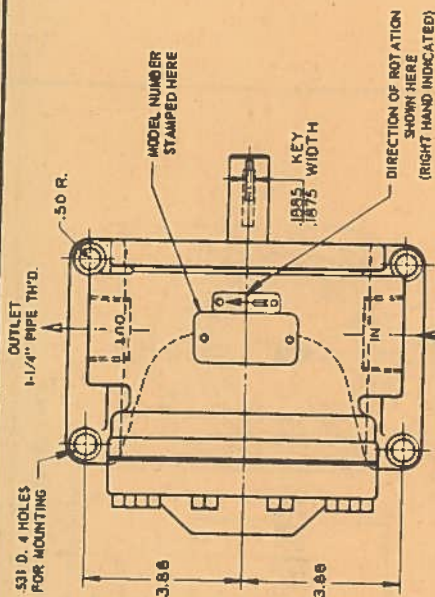
DELIVERY GPM

Y-1 G-3 C-8

E-2 A-5 D-10



# **VICKERS. VANE TYPE SINGLE PUMPS** FIXED DISPLACEMENT



## **FOOT MOUNTING** (STANDARD SHAFT)

MODEL NUMBER		PUMP CHARACTERISTICS AT 1200 GPM BY FLUID TYPE															
		CHARACTERISTICS AT OTHER DRIVE SPEEDS APPROXIMATELY PROPORTIONAL TO RPM															
		DATA BASED ON PERFORMANCE AT FLUID TEMPERATURE OF 120° F., VISCOSITY 150 SSU AT 100° F.															
FOOT MOUNTING	FLANGE MOUNTING	DELIVERY GPM			HP INPUT		MAX. DRIVE SPEED		PUMP FLOW (GPM)				CONTINUOUS		INTERMITTENT*		
		0 PSI	500 PSI	1000 PSI	0 PSI	1000 PSI	PETRO. LEUM	FIRE RESIS TANT	PETRO. LEUM	SYN. THETIC	WATER GLYCOL	PETRO. LEUM	SYN. THETIC	WATER GLYCOL	PETRO. LEUM	SYN. THETIC	WATER GLYCOL
V-124-20	V-125-20	15.4	14.5	13.6	.70	5.8	10.9			15.4	15.4	15.4					
V-134-20	V-135-20	19.5	18.8	18.0	.75	6.7	12.4	1500		19.5	19.5	19.5					
V-1340-20	V-1350-20	23.0	22.2	21.3	.80	8.1	14.9	1200		23	23	23	1000		1200		1000
V-144-20	V-145-20	29.9	28.9	27.8	1.00	9.7	18.8			29.9	-	29.9	-			-	
V-144-20	V-145-20	37.9	36.5	35.0	1.20	13.5	24.1	1200		37.9	-	-	-			-	

\*INTERMITTENT DUTY IS DEFINED AS 10% OF OVERALL TIME. NO ONE APPLICATION OF PRESSURE IS TO EXCEED 10% OF ONE MINUTE (6 SECONDS).

REVISED 1-8-44 R.W.S.

**VICKERS INCORPORATED**  
DIVISION OF SPERRY GYROSCOPE CORPORATION  
DETROIT, MICHIGAN, U.S.A.

INSTALLATION DRAWING

THIS DRAWING RELEASED  
CHECKED 9 - 1 - 50 N.W.  
DRAWN 7 - 13 - 50 A.N.  
**I-133744**

PUMPS  
FIXED DISPLACEMENT  
VANE TYPE

SINGLE

STANDARD  
DESIGN

14 TO 35 G.P.M. FOOT & FLANGE  
DISPLACEMENT MOUNTING

INST. DRWG.  
I-133744



# VICKERS. VANE TYPE SINGLE PUMPS FIXED DISPLACEMENT

## ROTATION

RIGHT HAND ROTATION VIEWED FROM DRIVESHAFT END IS STANDARD. LEFT HAND ROTATION MAY BE SPECIFIED BY ADDING SUFFIX "LH" TO MODEL NUMBER.

EXAMPLE: V-134X-20-LH

INLET AND OUTLET PORTS REMAIN AS SHOWN REGARDLESS OF DIRECTION OF SHAFT ROTATION. CHANGE OF INTERNAL ASSEMBLY IS NECESSARY WHEN CHANGE OF DRIVESHAFT ROTATION IS REQUIRED.

## FLUIDS PERMISSIBLE

PETROLEUM OIL WITH A VISCOSITY RANGING BETWEEN 150 AND 225 SSU AT 100°F. IS RECOMMENDED.

## PIRE-RESISTANT FLUIDS

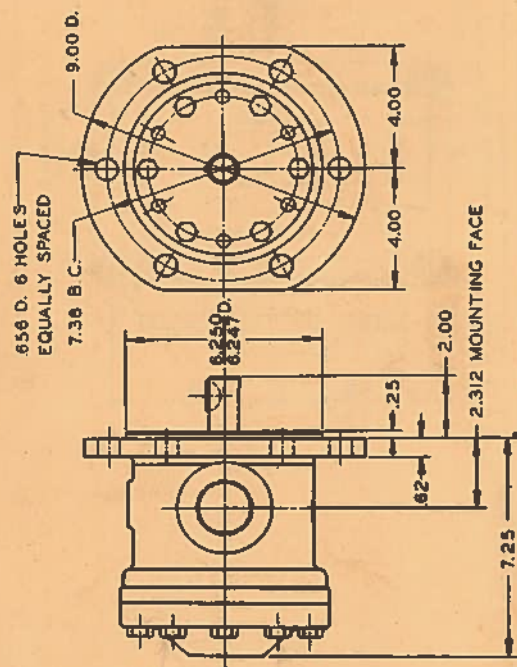
CAUTION: SYNTHETIC AND WATER GLYCOL TYPE FIRE-RESISTANT FLUIDS MAY BE USED, BUT THEY HAVE HIGH SPECIFIC GRAVITIES WHICH LIMIT THE GPM POSSIBLE THROUGH ANY ONE PUMP HOUSING. EXCEEDING THIS LIMIT WILL PRODUCE CAVITATION WITH RESULTANT WEAR AND NOISE. (SEE BULLETIN 59-73). DRIVE SPEED LIMITED TO 1200 RPM. SELECT GPM FROM CHART ON REVERSE SIDE.

SYNTHETIC FLUIDS: (PHOSPHATE ESTERS, PHOSPHATE ESTER BASE, AND CHLORINATED HYDROCARBON FLUIDS) AS PRODUCED BY RESPONSIBLE SOURCES, FOR RATINGS GIVEN HEREIN, ARE RECOMMENDED. SELECT FLUIDS WITH A VISCOSITY AS CLOSE AS POSSIBLE TO THAT FOR PETROLEUM OIL DESCRIBED ABOVE. SPECIFIC GRAVITY MUST NOT EXCEED 1.42.

PUMPS FOR USE WITH SYNTHETIC FLUIDS REQUIRE SEALS MADE OF DIFFERENT MATERIAL. TO OBTAIN PUMPS EQUIPPED WITH SPECIAL SEALS, ADD PREFIX "FV" TO MODEL NUMBER FOR PHOSPHATE ESTER AND PHOSPHATE ESTER BASE FLUIDS; "F3" FOR CHLORINATED HYDROCARBON FLUIDS.

EXAMPLE: FV-134X-20

## FLANGE MOUNTED (STANDARD SHAFT)



FOR OTHER DIMENSIONS, SEE FOOT MOUNTED MODEL ON REVERSE SIDE.

WATER GLYCOLS AS PRODUCED BY RESPONSIBLE SOURCES, FOR RATINGS GIVEN HEREIN, ARE RECOMMENDED. SELECT FLUIDS WITH A VISCOSITY AS CLOSE AS POSSIBLE TO THAT FOR PETROLEUM OIL DESCRIBED ABOVE. IT IS RECOMMENDED THAT TEMPERATURES FOR WATER GLYCOLS BE LIMITED TO A MAXIMUM OF 140°F, CONSISTENT WITH THE VISCOSITY RECOMMENDATIONS.

WATER-OIL EMULSIONS GENERALLY SHOULD NOT BE USED WITH THESE PUMPS. TO OBTAIN SATISFACTORY SERVICE WITH EMULSIONS, USE VICKERS 5214 TYPE PUMPS SHOWN ON INSTALLATION DRAWINGS I-236494 AND I-236495.

MAXIMUM SPEED RATINGS ARE GIVEN FOR THREE TYPES OF FLUIDS. SPEEDS ARE INFLUENCED BY SPECIFIC GRAVITY, VISCOSITY AND SUCTION HEAD. PUMP Suction AND SPEED SHOULD BE RELATED SO THAT VACUUM AT PUMP INLET DOES NOT EXCEED 5" OF MERCURY FOR PETROLEUM OIL, 3" FOR SYNTHETIC FLUID AND 5" FOR WATER GLYCOL TYPE FLUIDS.

## FILTRATION

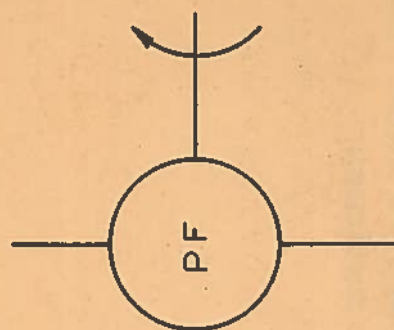
FOR MAXIMUM OVER-ALL EFFICIENCY AND SERVICE LIFE, FILTRATION OF 25 MICRON OR LESS IS RECOMMENDED. FOR FIRE RESISTANT FLUIDS THIS FILTRATION IS MANDATORY.

POSITION OF INLET AND OUTLET CONNECTIONS MAY BE REVERSED BY ROTATING PUMP BODY 180° IN FOOT MOUNTING.

MAXIMUM RECOMMENDED OPERATING PRESSURE	SEE CHART
MAXIMUM RECOMMENDED DRIVE SPEED (APPROX.)	SEE CHART
MINIMUM RECOMMENDED DRIVE SPEED	600 RPM
WEIGHT (APPROX.)	
FLANGE MOUNTED MODELS	50 LBS.
FOOT MOUNTED MODELS	52 LBS.

NOTE: PERFORMANCE DATA SHOWN ALSO APPLIES TO THE "VK" SERIES PUMPS AS FURNISHED ON MOTORPUMPS.

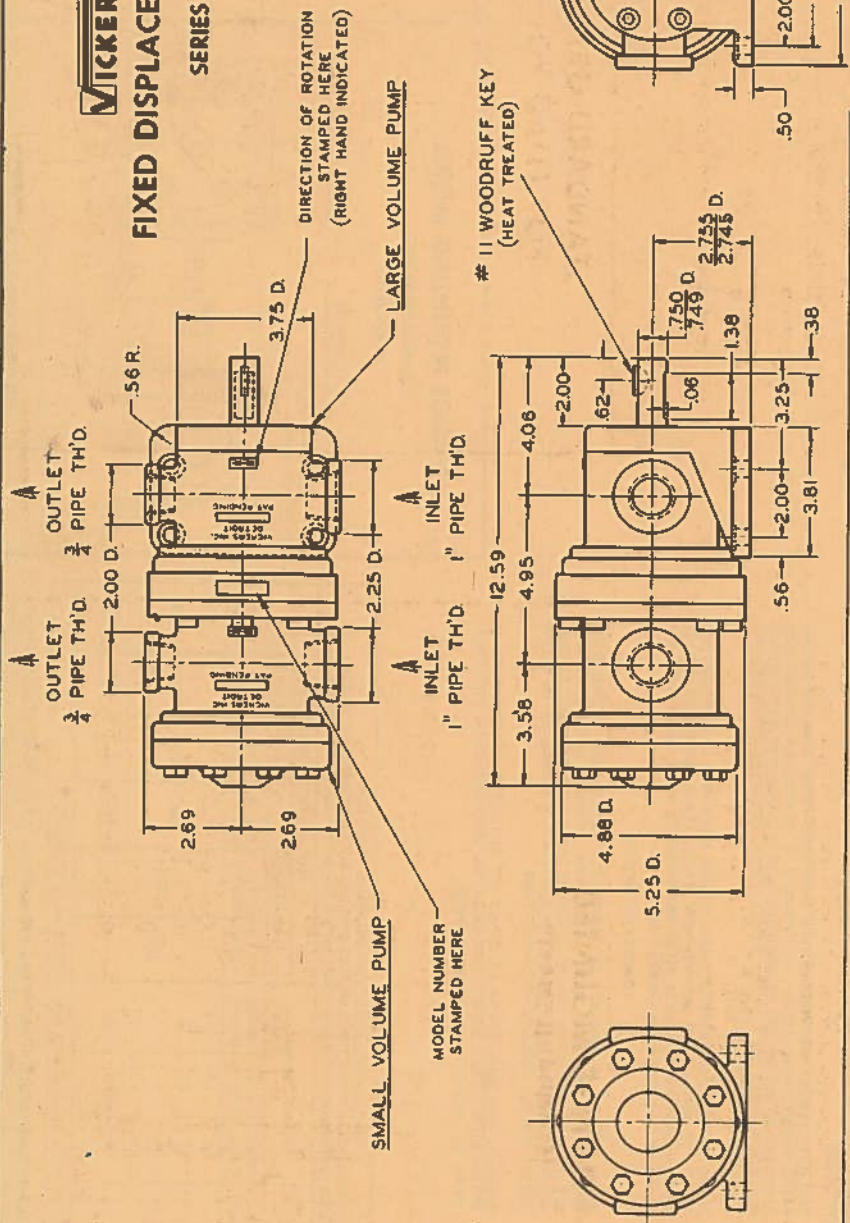
## STANDARD GRAPHICAL SYMBOLS FOR FLUID POWER DIAGRAMS





# VICKERS VANE TYPE FIXED DISPLACEMENT DOUBLE PUMPS

SERIES V-108 & V-109



## FOOT MOUNTING (STANDARD SHAFT)

SEE REVERSE SIDE FOR INFORMATION  
ON FLANGE MOUNTED MODELS.

REVISED 12-10-83 R.W.S.

**VICKERS INCORPORATED**  
DIVISION OF SPERRY RAND CORPORATION  
DETROIT, MICHIGAN, U.S.A.

INSTALLATION DRAWING

THIS DRAWING ORIGINALLY DESIGNED BY  
**I-136638**  
DATE 9-27-50  
BY 9-14-50 W.B.

MODEL NUMBER	CHARACTERISTICS AT 1200 RPM TABULATED DATA BASED ON PERFORMANCE AT 120° F. VISCOSITY 150 SSU AT 100° F														MAX. DRIVE SPEED
	LARGE VOLUME PUMP							SMALL VOLUME PUMP							
	DELIVERY GPM		HP INPUT		DELIVERY GPM			HP INPUT		DELIVERY GPM			HP INPUT		
FOOT MOUNTING	FLANGE MOUNTING	0 LBS. PER SQ. IN.	500 LBS. PER SQ. IN.	1000 LBS. PER SQ. IN.	0 LBS. PER SQ. IN.	500 LBS. PER SQ. IN.	1000 LBS. PER SQ. IN.	0 LBS. PER SQ. IN.	500 LBS. PER SQ. IN.	1000 LBS. PER SQ. IN.	0 LBS. PER SQ. IN.	500 LBS. PER SQ. IN.	1000 LBS. PER SQ. IN.	APPROX. RPM	
V-108-YY-10	V-109-YY-10	1.8	1.5	1.1	20	0.9	1.5	1.1	1.8	1.5	1.1	20	0.9	1.5	1800
V-108-YE-10	V-109-YE-10	2.7	2.4	2.0	25	1.2	2.2	2.2	1.8	1.5	1.1	20	0.9	1.5	1800
V-108-YG-10	V-109-YG-10	3.7	3.4	3.0	35	1.4	2.6	1.8	1.5	1.1	20	0.9	1.5	1800	
V-108-YA-10	V-109-YA-10	5.3	5.0	4.7	30	1.9	3.6	3.6	1.5	1.1	20	0.9	1.5	1800	
V-108-YC-10	V-109-YC-10	8.2	7.9	7.5	35	2.8	5.2	5.2	1.5	1.1	20	0.9	1.5	1500	
V-108-YD-10	V-109-YD-10	11.5	11.0	10.6	40	3.7	7.0	7.0	1.8	1.5	1.1	20	0.9	1.5	1200
V-108-EE-10	V-109-EE-10	2.7	2.4	2.0	25	1.2	2.2	2.2	2.7	2.4	2.0	25	1.2	2.2	1800
V-108-EG-10	V-109-EG-10	3.7	3.4	3.0	35	1.4	2.6	2.7	2.4	2.0	2.2	35	1.2	2.2	1800
V-108-EA-10	V-109-EA-10	5.3	5.0	4.7	30	1.9	3.6	3.6	2.7	2.4	2.0	25	1.2	2.2	1800
V-108-EC-10	V-109-EC-10	8.2	7.9	7.5	35	2.8	5.2	5.2	2.7	2.4	2.0	25	1.2	2.2	1500
V-108-ED-10	V-109-ED-10	11.5	11.0	10.6	40	3.7	7.0	7.0	2.7	2.4	2.0	25	1.2	2.2	1200
V-108-GG-10	V-109-GG-10	3.7	3.4	3.0	35	1.4	2.6	2.6	2.7	2.4	2.0	25	1.2	2.2	1800
V-108-GA-10	V-109-GA-10	5.3	5.0	4.7	30	1.9	3.6	3.6	3.7	3.4	3.0	25	1.4	2.6	1800
V-108-GC-10	V-109-GC-10	8.2	7.9	7.5	35	2.8	5.2	5.2	3.7	3.4	3.0	25	1.4	2.6	1800
V-108-GD-10	V-109-GD-10	11.5	11.0	10.6	40	3.7	7.0	7.0	3.7	3.4	3.0	25	1.4	2.6	1500
V-108-AA-10	V-109-AA-10	5.3	5.0	4.7	30	1.9	3.6	3.6	3.7	3.4	3.0	25	1.4	2.6	1200
V-108-AC-10	V-109-AC-10	8.2	7.9	7.5	35	2.8	5.2	5.2	5.3	5.0	4.7	30	1.9	3.6	1800
V-108-AD-10	V-109-AD-10	11.5	11.0	10.6	40	3.7	7.0	7.0	5.3	5.0	4.7	30	1.9	3.6	1500
V-108-CC-10	V-109-CC-10	8.2	7.9	7.5	35	2.8	5.2	5.2	8.2	7.9	7.5	35	2.8	3.2	1500
V-108-CD-10	V-109-CD-10	11.5	11.0	10.6	40	3.7	7.0	7.0	8.2	7.9	7.5	35	2.8	3.2	1200
V-108-DD-10	V-109-DD-10	11.5	11.0	10.6	40	3.7	7.0	7.0	11.5	11.0	10.6	40	3.7	3.2	1200

PUMPS  
FIXED DISPLACEMENT  
VANE TYPE

DOUBLE

STANDARD  
DESIGN

1 TO 11  
1 TO 11

G.P.M.

FOOT & FLANGE  
MOUNTING

INST. DRWG.  
I-136638



# VICKERS. VANE TYPE FIXED DISPLACEMENT DOUBLE PUMPS SERIES V-108 & V-109

## ROTATION

RIGHT HAND ROTATION VIEWED FROM DRIVESHAFT END IS STANDARD. LEFT HAND ROTATION MAY BE SPECIFIED BY ADDING SUFFIX "LH" TO MODEL NUMBER.

EXAMPLE: V-108-EE-10-LH

INLET AND OUTLET PORTS REMAIN AS SHOWN REGARDLESS OF DIRECTION OF SHAFT ROTATION. CHANGE OF INTERNAL ASSEMBLY IS NECESSARY WHEN CHANGE OF DRIVESHAFT ROTATION IS REQUIRED.

## FLUIDS PERMISSIBLE

PETROLEUM OIL WITH A VISCOSITY RANGING BETWEEN 150 AND 225 SSU AT 100° F IS RECOMMENDED. REFER TO DATA SHEET 266-S FOR RECOMMENDED OIL SPECIFICATIONS.

## FIRE RESISTANT FLUIDS

CAUTION: SYNTHETIC AND WATER GLYCOL TYPE FIRE-RESISTANT FLUIDS MAY BE USED, BUT THEY HAVE HIGH SPECIFIC GRAVITIES WHICH LIMIT THE GPM POSSIBLE THROUGH ANY ONE PUMP HOUSING. EXCEEDING THIS LIMIT WILL PRODUCE CAVITATION WITH RESULTANT WEAR AND NOISE. (SEE BULLETIN 59-73). DRIVE SPEED LIMITED TO 1200 RPM. SELECT GPM FROM CHART BELOW.

SYNTHETIC FLUIDS: PHOSPHATE ESTERS, PHOSPHATE ESTER BASE AND CHLORINATED HYDROCARBON FLUIDS, AS PRODUCED BY RESPONSIBLE SOURCES FOR RATINGS GIVEN HEREIN, ARE RECOMMENDED. SELECT FLUIDS WITH A VISCOSITY AS CLOSE AS POSSIBLE TO THAT FOR PETROLEUM OIL DESCRIBED ABOVE. SPECIFIC GRAVITY MUST NOT EXCEED 1.42.

PUMPS FOR USE WITH SYNTHETIC FLUIDS REQUIRE SEALS MADE OF DIFFERENT MATERIAL. TO OBTAIN PUMPS EQUIPPED WITH SPECIAL SEALS, ADD PREFIX "FI" TO MODEL NUMBER FOR PHOSPHATE ESTER AND PHOSPHATE ESTER BASE FLUIDS; ADD P3 FOR CHLORINATED HYDROCARBON FLUIDS.

EXAMPLE: FIV-108-EE-10

WATER GLYCOLS AS PRODUCED BY RESPONSIBLE SOURCES, FOR RATINGS GIVEN HEREIN ARE RECOMMENDED. SELECT FLUIDS WITH A VISCOSITY AS CLOSE AS POSSIBLE TO THAT FOR PETROLEUM OIL DESCRIBED ABOVE. IT IS RECOMMENDED THAT TEMPERATURES FOR WATER GLYCOLS BE LIMITED TO A MAXIMUM OF 140°F, CONSISTENT WITH THE VISCOSITY RECOMMENDATIONS.

WATER-OIL EMULSIONS GENERALLY SHOULD NOT BE USED WITH THESE PUMPS. TO OBTAIN SATISFACTORY SERVICE WITH EMULSIONS, USE VICKERS S21A TYPE PUMPS SHOWN ON INSTALLATION DRAWING I-246700.

MAXIMUM SPEED RATINGS ARE GIVEN FOR THREE TYPES OF FLUIDS. SPEEDS ARE INFLUENCED BY SPECIFIC GRAVITY, VISCOSITY AND SUCTION HEAD. PUMP SUCTION AND SPEED SHOULD BE RELATED SO THAT VACUUM AT PUMP INLET DOES NOT EXCEED 5" OF MERCURY FOR PETROLEUM OIL, 3" FOR SYNTHETIC FLUID AND 9" FOR WATER GLYCOL TYPE FLUIDS.

## FILTRATION

FOR MAXIMUM OVER-ALL EFFICIENCY AND SERVICE LIFE, FILTRATION OF 25 MICRON OR LESS IS RECOMMENDED. FOR FIRE RESISTANT FLUIDS THIS FILTRATION IS MANDATORY.

MAXIMUM RECOMMENDED OPERATING PRESSURE ..... 1000 PSI

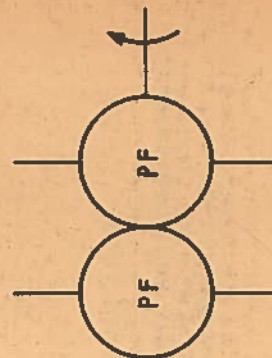
MAXIMUM RECOMMENDED DRIVE SPEED ..... SEE CHART

MINIMUM RECOMMENDED DRIVE SPEED ..... 600 RPM

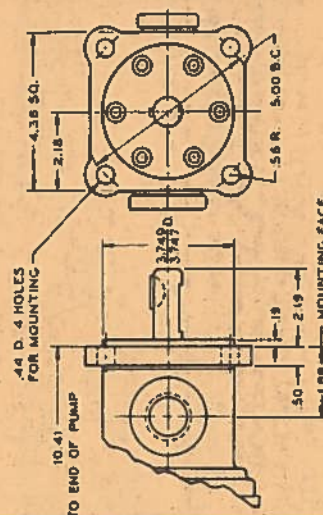
WEIGHT (APPROX.) - ALL MODELS ..... 38 LBS.

NOTE: PERFORMANCE DATA SHOWN ALSO APPLIES TO THE "VK" SERIES PUMPS AS FURNISHED ON MOTORPUMPS.

## STANDARD GRAPHICAL SYMBOLS FOR FLUID POWER DIAGRAMS



## FLANGE MOUNTING MODEL (STANDARD SHAFT) V-109-EE-10



FOR OTHER DIMENSIONS SEE MODELS WITH FOOT MOUNTING.

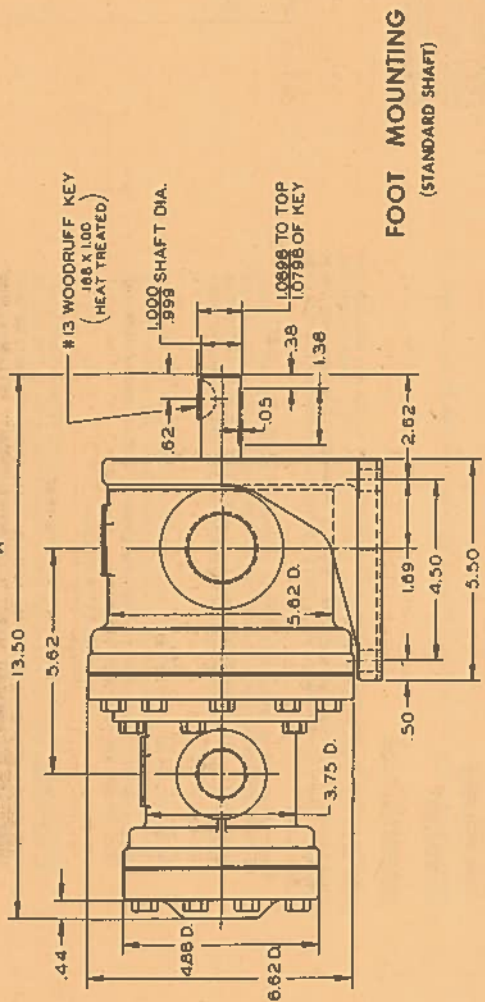
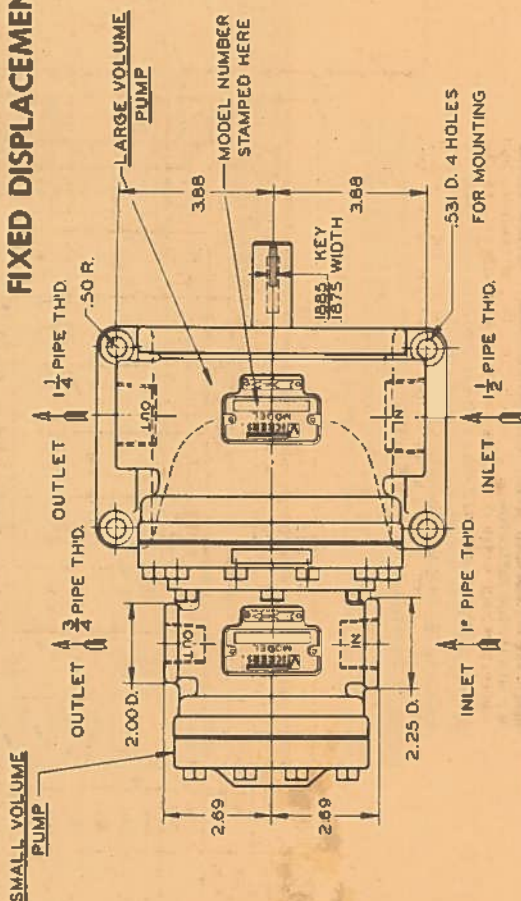
PUMP CARTRIDGE SIZE (HEAD OR SHAFT END)	PUMP CHARACTERISTICS AT 1200 RPM BY FLUID TYPE									
	CHARACTERISTICS AT OTHER DRIVE SPEEDS APPROXIMATELY PROPORTIONAL TO RPM DATA BASED ON PERFORMANCE AT FLUID TEMPERATURE OF 120° F. VISCOSITY 150 SSU AT 100° F					MAX OPERATING PRESSURE				
	MAX. DRIVE SPEED	FIRE- RESISTANT	PETRO- LEUM	SYN- THETIC	WATER GLYCOL	CONTINUOUS	PETRO- LEUM	SYN- THETIC	WATER GLYCOL	*INTERMITTENT
Y	1800		1.8	1.8	1.8					
E	1800		2.7	2.7	2.7					
G	1800		3.7	3.7	3.7	1000	1000	1000	1500	1200
A	1800	1200	5.3	5.3	5.3					
C	1500		8.2	18.2	8.2					
D	1200		11.5	-	-					

SEE REVERSE SIDE FOR COMPLETE MODEL NUMBERS AND INPUT HORSEPOWER REQUIREMENTS.

\*INTERMITTENT DUTY IS DEFINED AS 10% OF OVERALL TIME NO ONE APPLICATION OF PRESSURE IS TO EXCEED 10% OF ONE MINUTE (6 SECONDS).  
18 GPM MAY BE OBTAINED WITH "C" SIZE PUMP BY LIMITING THE SYNTHETIC FLUID TO A SPECIFIC GRAVITY OF 1.18



# **VICKERS. VANE TYPE** **FIXED DISPLACEMENT DOUBLE PUMP**



OPERATING CHARACTERISTICS AT 1200 RPM  
CHARACTERISTICS AT OTHER DRIVE SPEEDS APPROXIMATELY PROPORTIONAL TO RPM  
DATA BASED ON PERFORMANCE AT OIL TEMPERATURE OF 120° F. - VISCOSITY 150 SSU AT 100° F.

MODEL NUMBER	FLANGE MOUNTING	LARGE VOLUME (SHAFT END) PUMP				SMALL VOLUME (HEAD END) PUMP			
		DELIVERY GPM	HP INPUT	PSI	PSI	DELIVERY GPM	HP INPUT	PSI	PSI
V-128-20		15.4	14.5	13.6	70	5.0	10.9	1000	1000
V-138-20		19.5	18.0	16.0	75	6.7	12.4	1000	1000
V-138L-20		23.0	22.2	21.3	80	8.1	14.9	1000	1000
V-138X-20		29.9	28.9	27.8	1.00	9.7	18.8	1000	1000
V-148-20		37.9	36.5	35.0	1.20	13.5	24.1	1000	1000

ASTERISK IN MODEL NUMBER DENOTES GPM RATING OF SMALL VOLUME PUMP. INDICATE SMALL VOLUME RING SIZE BY SUBSTITUTING LETTER DESIGNATION Y, E, G, A, C, OR D IN PLACE OF ASTERISK WHEN ORDERING.

PUMPS  
FIXED DISPLACEMENT  
VANE TYPE

DOUBLE

TANDEM  
DESIGN

1 TO 11  
14 TO 35 } G.P.M.

FOOT & FLANGE  
MOUNTING

INST. DRWG.  
I-135250

REVISED 1.15.64 R.W.S.

VICKERS INCORPORATED  
DIVISION OF SPERRY RAND CORPORATION  
PITTSBURGH, PENNSYLVANIA, U.S.A.

INSTALLATION DRAWING

THIS DRAWING REPRODUCED  
CHECKED 8-17-55 N.M.  
I-135250  
DRAWN 7-21-55 W.S.



# VICKERS. VANE TYPE FIXED DISPLACEMENT DOUBLE PUMP

## ROTATION

RIGHT HAND ROTATION VIEWED FROM DRIVESHAFT END IS STANDARD. LEFT HAND ROTATION MAY BE SPECIFIED BY ADDING SUFFIX "LH" TO MODEL NUMBER.

EXAMPLE: V-138-E-20-LH

INLET AND OUTLET PORTS REMAIN AS SHOWN REGARDLESS OF DIRECTION OF SHAFT ROTATION. CHANGE OF INTERNAL ASSEMBLY IS NECESSARY WHEN CHANGE OF DRIVESHAFT ROTATION IS REQUIRED.

## FLUIDS PERMISSIBLE

PETROLEUM OIL WITH A VISCOSITY RANGING BETWEEN 150 AND 225 SSU AT 100°F. IS RECOMMENDED.

## FIRE-RESISTANT FLUIDS

CAUTION: SYNTHETIC AND WATER GLYCOL TYPE FIRE-RESISTANT FLUIDS MAY BE USED, BUT THEY HAVE HIGH SPECIFIC GRAVITIES WHICH LIMIT THE GPM POSSIBLE THROUGH ANY ONE PUMP HOUSING. EXCEEDING THIS LIMIT WILL PRODUCE CAVITATION WITH RESULTANT WEAR AND NOISE (SEE BULLETIN 59-73). DRIVE SPEED LIMITED TO 1200 RPM. SELECT GPM FROM CHART BELOW.

SYNTHETIC FLUIDS (PHOSPHATE ESTERS, PHOSPHATE ESTER BASE AND CHLORINATED HYDROCARBON FLUIDS) AS PRODUCED BY RESPONSIBLE SOURCES, FOR RATINGS GIVEN HEREIN, ARE RECOMMENDED. SELECT FLUIDS WITH A VISCOSITY AS CLOSE AS POSSIBLE TO THAT FOR PETROLEUM OIL DESCRIBED ABOVE. SPECIFIC GRAVITY MUST NOT EXCEED 1.42.

PUMPS FOR USE WITH SYNTHETIC FLUIDS REQUIRE SEALS MADE OF DIFFERENT MATERIAL. TO OBTAIN PUMPS EQUIPPED WITH SPECIAL SEALS, ADD PREFIX "FV" TO MODEL NUMBER FOR PHOSPHATE ESTERS AND PHOSPHATE ESTER BASE FLUIDS, ADD "F3" FOR CHLORINATED HYDROCARBONS.

EXAMPLE: FV-138-E-20

WATER GLYCOLS AS PRODUCED BY RESPONSIBLE SOURCES, FOR RATINGS GIVEN HEREIN, ARE RECOMMENDED. SELECT FLUIDS WITH A VISCOSITY AS CLOSE AS POSSIBLE TO THAT FOR PETROLEUM OIL DESCRIBED ABOVE. IT IS RECOMMENDED THAT TEMPERATURES FOR WATER GLYCOLS BE LIMITED TO A MAXIMUM OF 140°F. CONSISTENT WITH THE VISCOSITY RECOMMENDATIONS.

WATER OIL EMULSIONS GENERALLY SHOULD NOT BE USED WITH THESE PUMPS. TO OBTAIN SATISFACTORY SERVICE WITH EMULSIONS, USE VICKERS 5214 TYPE PUMPS SHOWN ON INSTALLATION DRAWINGS 1-248701 AND 1-248702.

MAXIMUM SPEED RATINGS ARE GIVEN FOR THREE TYPES OF FLUIDS. SPEEDS ARE INFLUENCED BY SPECIFIC GRAVITY, VISCOSITY AND SUCTION HEAD. PUMP SUCTION AND SPEED SHOULD BE RELATED SO THAT VACUUM AT PUMP INLET DOES NOT EXCEED 5" OF MERCURY FOR PETROLEUM OIL, 3" FOR SYNTHETIC FLUID AND 5" FOR WATER GLYCOL TYPE FLUIDS.

## FILTRATION

FOR MAXIMUM OVER-ALL EFFICIENCY AND SERVICE LIFE, FILTRATION OF 25 MICRON OR LESS IS RECOMMENDED. FOR FIRE RESISTANT FLUIDS THIS FILTRATION IS MANDATORY.

MAXIMUM RECOMMENDED OPERATING PRESSURE . . . . . SEE CHART

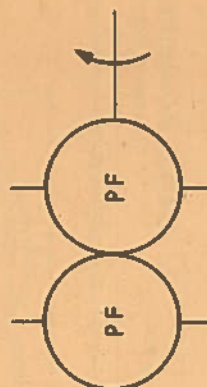
MAXIMUM RECOMMENDED DRIVE SPEED (APPROX.) . . . . . SEE CHART

MINIMUM RECOMMENDED DRIVE SPEED . . . . . 600 RPM

WEIGHT (APPROX.) - ALL MODELS . . . . . 66 LBS.

NOTE: PERFORMANCE DATA SHOWN ALSO APPLIES TO THE "VK" SERIES PUMPS AS FURNISHED ON MOTOR PUMPS.

## STANDARD GRAPHICAL SYMBOLS FOR FLUID POWER DIAGRAMS



PUMP CHARACTERISTICS AT 1200 RPM BY FLUID TYPE																
CHARACTERISTICS AT OTHER DRIVE SPEEDS APPROXIMATELY PROPORTIONAL TO RPM																
DATA BASED ON PERFORMANCE AT FLUID TEMPERATURE OF 120° F. VISCOSITY 150 SSU AT 100° F.																
MODEL SERIES	MAX. DRIVE SPEED	PUMP FLOW (GPM)						MAXIMUM OPERATING PRESSURE (PSI)								
		CONTINUOUS						* * INTERMITTENT								
		LARGE VOLUME PUMP			SMALL VOLUME PUMP			LARGE VOLUME PUMP				SMALL VOLUME PUMP				
PETRO. LEUM	FIRE-RESISTANT	PETRO. LEUM	SYN. THETIC	WATER GLYCOL	PETRO. LEUM	SYN. THETIC	WATER GLYCOL	PETRO. LEUM	SYN. THETIC	WATER GLYCOL	PETRO. LEUM	SYN. THETIC	WATER GLYCOL	PETRO. LEUM	SYN. THETIC	WATER GLYCOL
V-128*	1200	15.4	15.4	15.4	Y- 1.8	Y-1.8	Y-1.8	Y-1.8	Y-1000	Y-1000	Y-1000			Y-1500	Y-1500	Y-1200
V-138*		19.5	19.5	19.5	E- 2.7	E-2.7	E-2.7	E-1000	E-1000	E-1000			E-1500	E-1500	E-1200	
V-138U*		23.0	23.0	23.0	G- 3.7	G-3.7	G-3.7	G-1000	G-1000	G-1000	G-1000	1200	1000	G-1500	G-1500	G-1200
V-138K*	1200	29.9	-	29.9	A- 5.3	A-5.3	A-5.3	A-1000	A-1000	A-1000	1200			A-1500	A-1500	A-1200
V-148*		37.9	-	-	D-11.5	D- -	D- -	D-1000	D- -	D- -	D- -	-	-	D-1200	D-1200	D- -

\* WHEN SMALL VOLUME PUMP IS THE 11.5 GPM "D" SIZE, DRIVE SPEED MAY NOT EXCEED 1200 RPM. 18.2 GPM MAY BE OBTAINED WITH SMALL VOLUME "C" PUMP BY LIMITING THE SYNTHETIC FLUID TO A SPECIFIC GRAVITY OF 1.20.

\* INTERMITTENT DUTY IS DEFINED AS 10% OF OVERALL TIME. NO ONE APPLICATION OF PRESSURE IS TO EXCEED 10% OF ONE MINUTE (6 SECONDS).



**General Data**

These Sperry Vickers two pressure pumps consist of two vane pumps driven by a single shaft. The unit functions in a manner similar to a variable delivery pump having one selective high volume and one selective low volume setting. An automatic pressure actuated valve operates in conjunction with two constant delivery pumps to make available to the hydraulic system either the delivery of both pumps at lower operating pressures or the delivery of one pump at higher operating pressures. The "combination 3" pressure control consists of an adjustable relief valve and unloading valve. The unloading valve must be manually set at least 125-150 PSI below the relief valve setting.

**SPERRY VICKERS**  
TROY, MICHIGAN 48084

**TWO PRESSURE PUMPS**

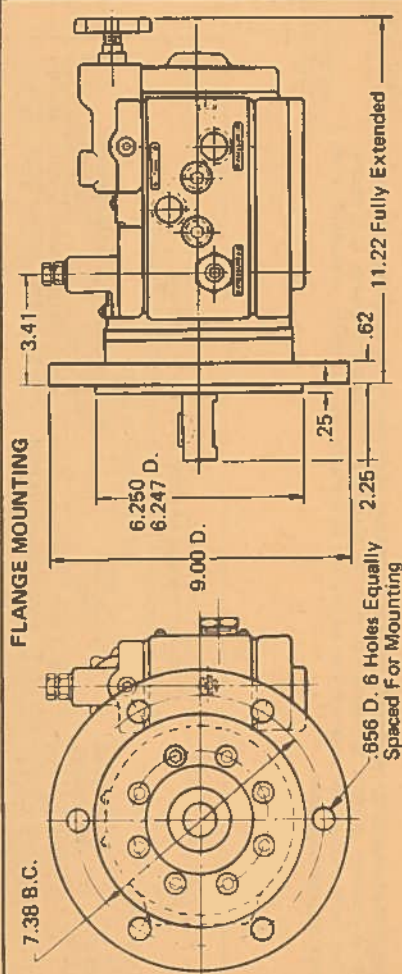
**FIXED DISPLACEMENT VANE TYPE**

**INTEGRAL DESIGN COMB. 3**

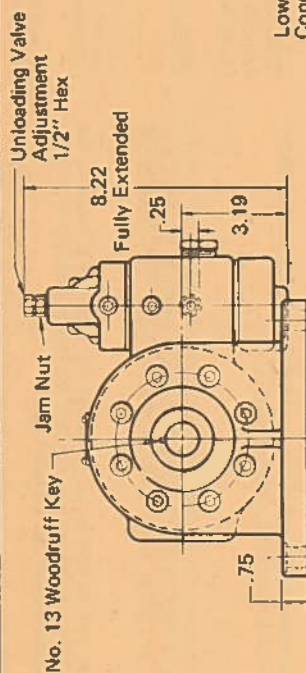
**5 TO 22 GPM DISPLACEMENT**

**FOOT OR FLANGE MOUNTING**

**DWG. NO. 501940**



**FLANGE MOUNTING**



**FOOT MOUNTING**

Typical Performance Data Based On Operation At 1200 RPM,  
Oil Temperature 120°F., Viscosity 150 SSU At 100°F.  
Characteristics At Other Speeds Approximately Proportional

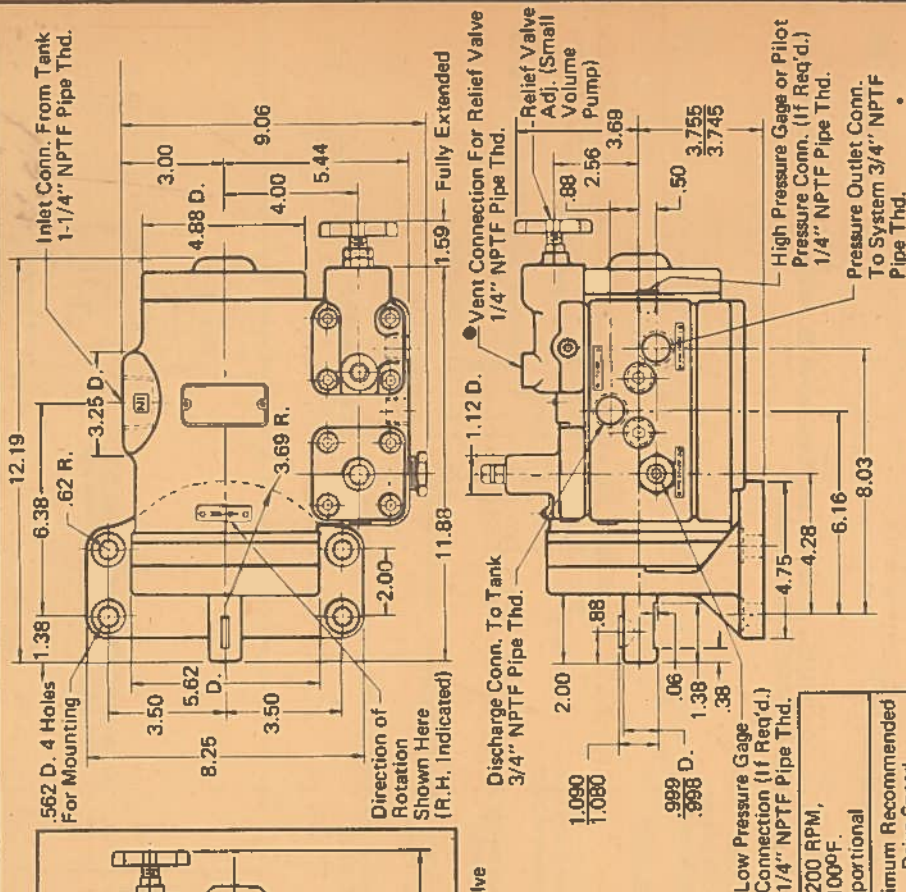
* Ring Size	Delivery GPM @ PSI			HP Input @ PSI			Maximum Recommended Drive Speed RPM
	0	500	1000	0	500	1000	
Y	1.8	1.5	1.1	.20	0.9	1.5	1800
E	2.7	2.4	2.0	.25	1.2	2.2	1800
G	3.7	3.4	3.0	.25	1.4	2.6	1800
A	5.3	5.0	4.7	.30	1.9	3.6	1800
C	8.2	7.9	7.5	.35	2.8	5.2	1500
D	11.5	11.0	10.6	.40	3.7	7.0	1200

\* See model code for placement of each of the two ring sizes in the model number;  
Example: VC-108-YD-3DB-6.

**TWO PRESSURE PUMPS WITH INTEGRAL RELIEF VALVES**

**SPERRY VICKERS**

**FIXED DISPLACEMENT - VANE TYPE  
SMALL VC-108/9 SERIES COMBINATION "3"**



**FOOT MOUNTING**

● Leave Vent Connection Plugged Except When Circuit Indicates A Connection For "Venting" Relief Valve.

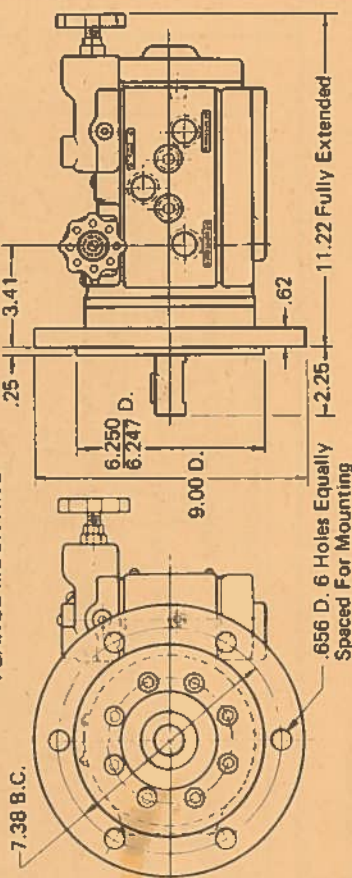


**SPERRY VICKERS**  
TROY, MICHIGAN 48084

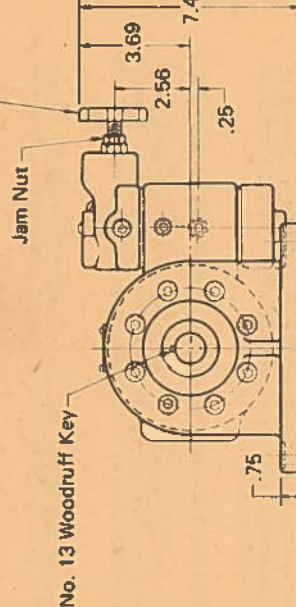
**General Data**

These Sperry Vickers double pumps consist of two fixed delivery vane pumps driven by a single shaft with separate outlets for each pump. Delivery of the large volume pump is at pressure outlet no. 2 and small volume pump delivery at pressure outlet no. 1. Delivery of each pump is independent of the other. Adjustable balanced piston type relief valves are provided for each pump for overload protection and to govern maximum working pressures.

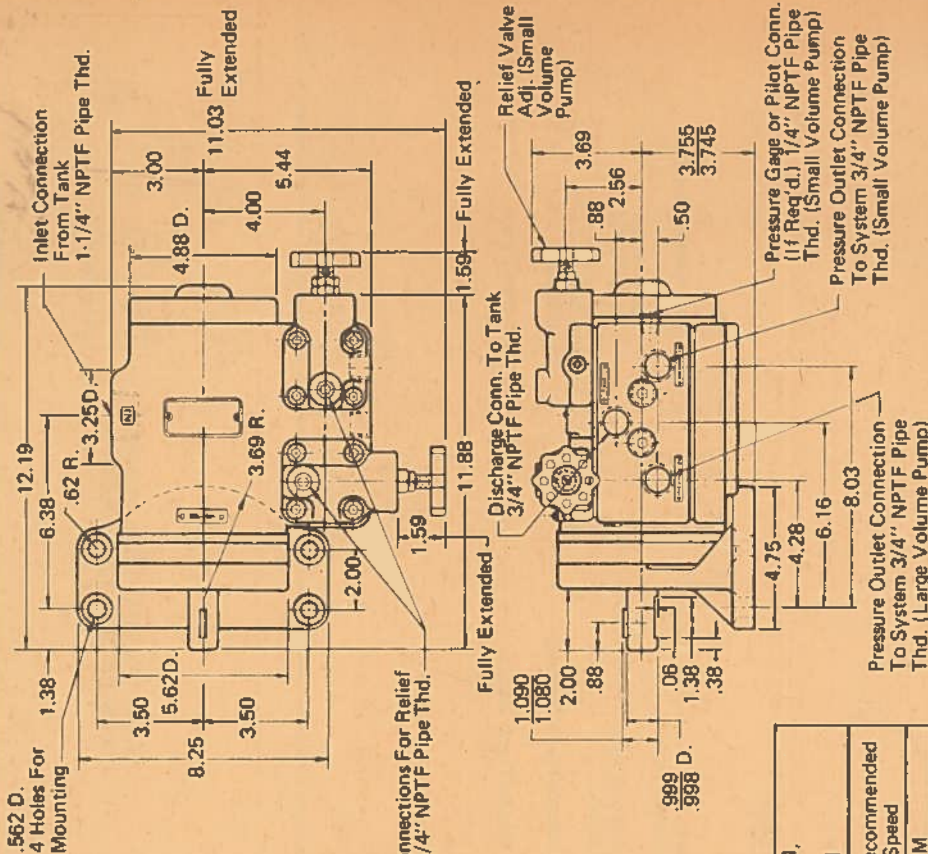
**FLANGE MOUNTING**



Relief Valve Adjustment  
(Large Volume Pump)



• Vent Connections For Relief  
Valves 1/4" NPTF Pipe Thd.



**FOOT MOUNTING**

• Leave Vent Connections Plugged Except  
When Circuit Indicates A Connection  
For "Venting" Relief Valve

• Ring Size	Delivery GPM @ PSI		HP Input @ PSI		Maximum Recommended Drive Speed	
	0	500	1000	0	500	1000
Y	1.8	1.5	1.1	20	0.9	1.5
E	2.7	2.4	2.0	25	1.2	2.2
G	3.7	3.4	3.0	25	1.4	2.6
A	5.3	5.0	4.7	30	1.9	3.6
C	8.2	7.9	7.5	35	2.8	5.2
D	11.5	11.0	10.6	40	3.7	7.0
						1200

Typical Performance Data Based On Operation At 1200 RPM,  
Oil Temperature 120°F., Viscosity 150 SSU At 100°F.  
Characteristics At Other Speeds Approximately Proportional

\* See model code for placement of each of the two ring sizes in the model number;  
Example: VC-108-YD-6D8-6.

**DOUBLE PUMPS WITH  
INTEGRAL RELIEF VALVES**

**FIXED DISPLACEMENT - VANE TYPE  
SMALL VC-108/9 SERIES COMBINATION "6"**



**Drive Shaft Rotation**

Drive shaft rotation and mounting arrangement is dependent upon assembly of internal parts and is ascertained by viewing the drive shaft end of pump. Right hand rotation (clockwise) is standard and is designated by the model numbers tabulated on the reverse side. Left hand rotation must be specified by adding suffix **LH** to model number.

Example: VC-108-YG-8DD-6-LH

**Fluids, Seals and Temperature**

Petroleum Oil with a viscosity ranging between 150 and 225 SSU at 100°F. is recommended. Refer to data sheet 1-286-S for hydraulic fluid and temperature recommendations.

**Fire-Resistant Fluids**

Synthetic and water glycol type fire-resistant fluids may be used, but they have high specific gravities which limit the GPM possible through any one pump housing. Exceeding this limit will produce cavitation with resultant wear and noise. Drive speed limited to 1200 RPM. Select GPM from chart below.

Synthetic Fluids (Phosphate ester fluids and its blends) as produced by responsible sources, for ratings given herein, are recommended. Select fluids with a viscosity as close as possible to that for petroleum oil described above. Specific gravity must not exceed 1.42.

Seals for all commonly used hydraulic fluids are standard. F3 prefix not required. (After Feb. '78)

Water Glycols as produced by responsible sources, for ratings given herein, are recommended. Select fluids with a viscosity as close as possible to that for petroleum oil described above. It is recommended that temperatures for water glycols be limited to a maximum of 130°F., consistent with the viscosity recommendations.

Water-Oil Emulsions generally should not be used with these pumps. To obtain satisfactory service with emulsions, use Sperry Vickers S214 type pumps (Installation drawing I-248700) and separate valving.

Maximum Speed Ratings are given for three types of fluids. Speeds are influenced by specific gravity, viscosity and suction head. Pump suction and speed should be related so that vacuum at pump inlet does not exceed 5" of mercury for petroleum oil, 3" for synthetic fluid and 5" for water glycol type fluids.

Pump Cartridge Size (Head or Shaft) End	Pump Ratings At 1200 RPM By Fluid Type Fluid Temperature 120°F. Viscosity 150 SSU At 100°F. See Performance Data						
	Maximum Drive Speed		Maximum Pump Flow			Maximum Operating Pressure	
	Petro-leum	Fire-Resistant	Petro-leum	Syn-thetic	Water Glycols	Petro-leum	Syn-thetic Water Glycols
Y	1800	1200	1.8	1.8	1.8	1000	1000
E	1800		2.7	2.7	2.7		
G	1800		3.7	3.7	3.7		
A	1800		5.3	5.3	5.3		
C	1500		8.2	8.2	8.2		
D	1200		11.5	—	—	—	—

● 8.2 GPM may be obtained with small volume "C" pump by limiting the synthetic fluid to a specific gravity of 1.20.

Minimum Speed Rating (RPM)..... 600

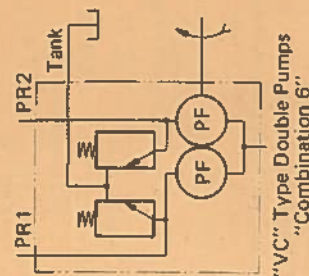
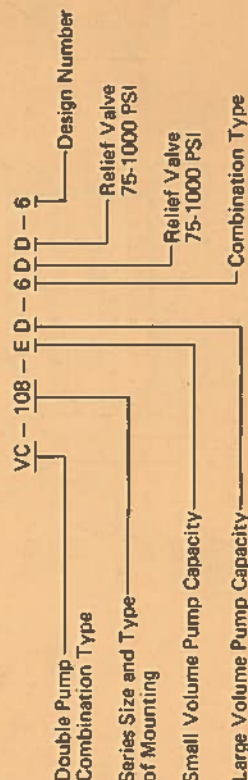
**Filtration**

For maximum overall efficiency and service life, filtration of 25 micron or less is recommended.

**Weight Lbs. (Approx.)**

Foot Mounting..... 85

Flange Mounting..... 80

**Model Code**

STANDARD GRAPHICAL SYMBOLS  
FOR FLUID POWER DIAGRAMS

"VC" Type Double Pumps  
"Combination 6"



**General Data**

These Sperry Vickers two pressure pumps consist of two vane pumps driven by a single shaft. The unit functions in a manner similar to a variable delivery pump having one selective high volume and one selective low volume setting. An automatic pressure actuated valve operates in conjunction with two constant delivery integral pumps to make available to the hydraulic system the delivery of both pumps at lower operating pressures or the delivery of one pump at higher operating pressures.

**SPERRY VICKERS**  
TROY, MICHIGAN 48084

**TWO PRESSURE PUMPS**

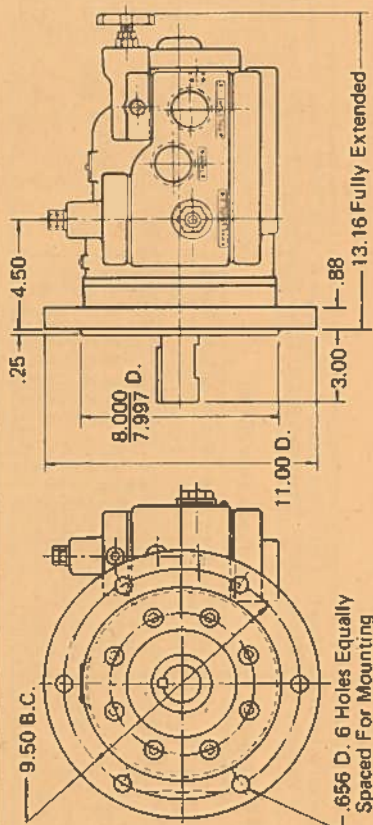
**FIXED DISPLACEMENT VANE TYPE**

**INTEGRAL DESIGN COMB. 3**

**16 TO 48 GPM DISPLACEMENT**

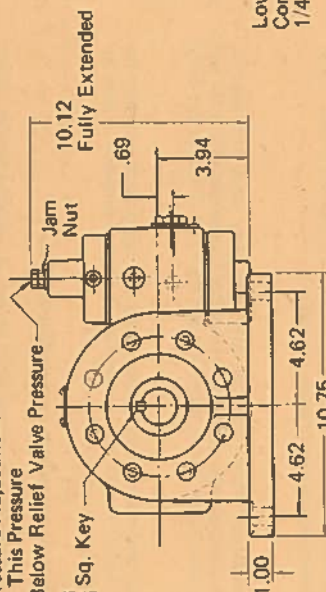
**FOOT OR FLANGE MOUNTING**

**DWG. NO. 501960**



**FLANGE MOUNTING**

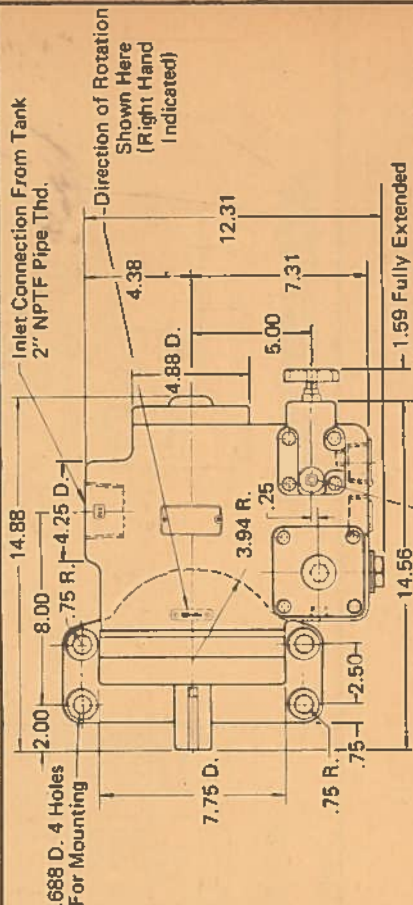
Unloading Valve Pressure Adjustment  
9/16 Hex - Note: This Pressure  
Must Be 150 PSI Below Relief Valve Pressure



**SPERRY VICKERS**

**TWO PRESSURE PUMPS WITH INTEGRAL RELIEF VALVES**

**FIXED DISPLACEMENT - VANE TYPE  
LARGE SERIES COMBINATION "3"**



Inlet Connection From Tank  
2" NPTF Pipe Thd.  
Direction of Rotation  
Shown Here  
(Right Hand  
Indicated)

Discharge Connection  
To Tank 1-1/4" NPTF Pipe Thd.

Jam Nut

Vent Connection For Relief Valve 1/4" NPTF  
Pipe Thd. - Leave Vent Connection Plugged  
Except When Circuit Indicates A Connection  
For "Venting" Relief Valve

Relief Valve Pressure  
Adjustment (Small  
Volume Pump)

High Pressure Gauge or  
Pilot Pressure Connection  
(If Req'd.) 1/4" NPTF Pipe Thd.

Pressure Outlet Connection  
To System - 1-1/4 NPTF Pipe Thd.

Low Pressure Gauge  
Connection (If Req'd.)  
1/4" NPTF Pipe Thd.

10.00  
7.75  
6.50  
5.50

2.75  
2.25  
1.669  
1.669  
1.499  
1.498  
1.38  
.88

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2.12  
3.25  
.25  
.41  
4.755  
4.745

10.00  
7.75  
6.50  
5.50

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1.669  
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1.498  
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1.498  
1.38  
.88

Typical Performance Data Based On Operation At 1200 RPM, Oil Temperature 120°F.  
Viscosity 150 SSU At 100°F. Characteristics At Other Speeds Approximately Proportional

Model Number	Large Volume (Shaft End) Pump				Small Volume (Head End) Pump										
	Foot Mounting	Flange Mounting	Delivery GPM @ PSI	HP Input @ PSI	Small Volume Pump Symbol	Delivery GPM @ PSI	HP Input @ PSI								
VC-128 * 3D * 5	VC-128 * 3D * 5	VC-129 * 3D * 5	15.4	14.5	13.6	7.0	5.8	10.9	Y	1.8	1.5	1.1	20	0.9	1.5
VC-138 * 3D * 5	VC-138 * 3D * 5	VC-139 * 3D * 5	19.5	18.8	18.0	.75	6.7	12.4	E	2.7	2.4	2.0	25	1.9	2.2
VC-138U * 3D * 5	VC-138U * 3D * 5	VC-138U * 3D * 5	23.0	22.2	21.3	.80	8.1	14.9	G	3.7	3.4	3.0	25	1.4	2.6
VC-138X * 3D * 5	VC-138X * 3D * 5	VC-138X * 3D * 5	29.9	28.9	27.8	1.0	9.7	18.8	A	5.3	5.0	4.7	30	1.9	3.8
VC-148 * 3D * 5	VC-148 * 3D * 5	VC-149 * 3D * 5	37.9	36.5	35.0	1.2	13.5	24.1	C	8.2	7.9	7.5	35	2.8	5.2
									D	11.5	11.0	10.6	40	3.7	7.0

First asterisk in model number denotes GPM rating of small volume pump. Indicate small volume ring size by substituting letter designation Y, E, G, A, C, or D in place of asterisk when ordering. See model code on reverse side.

REVISED 10 - 2 - 78

MR NAJAM  
G-MBA  
4553037  
501960

SEC. b



### Drive Shaft Rotation

Drive shaft rotation and mounting arrangement is dependent upon assembly of internal parts and is ascertained by viewing the drive shaft end of pump. Right hand rotation (clockwise) is standard and is designated by the model numbers tabulated on the reverse side. Left hand rotation must be specified by adding suffix LH to model number.

Example: VC-149-D-3DD-5-LH

### Combined Pump Delivery

Output of pumps for low pressure operation is determined by adding delivery ratings for each pump selected. High pressure delivery is the GPM capacity of the smaller head end pump of the two pumps in the combination. Horsepower input for these pumps is usually determined by peak pressure of the high pressure (small volume) pump. Power load is thus proportioned for large volume, low pressure and small volume, high pressure operation.

Performance Data given is based on rated GPM delivery and horsepower of each pump separately in the combination.

### Fluids and Seals

Petroleum Oil with a viscosity ranging between 150 and 225 SSU at 100°F. is recommended. Refer to data sheet I-286-S for hydraulic fluid and temperature recommendations.

### Fire-Resistant Fluids

Synthetic and water glycol type fire-resistant fluids may be used, but they have high specific gravities which limit the GPM possible through any one pump housing. Exceeding this limit will produce cavitation with resultant wear and noise. Drive speed limited to 1200 RPM. Select GPM from chart below.

Synthetic Fluids (Phosphate ester fluids and its blends) as produced by responsible sources, for ratings given herein, are recommended. Select fluids with a viscosity as close as possible to that for petroleum oil described above. Specific gravity must not exceed 1.42.

Pumps are equipped with seals for use with all commonly used hydraulic fluids.

Water Glycols as produced by responsible sources, for ratings given herein, are recommended. Select fluids with a viscosity as close as possible to that for petroleum oil described above. It is recom-

mended that temperatures for water glycols be limited to a maximum of 130°F., consistent with the viscosity recommendations.

Water-Oil Emulsions generally should not be used with these pumps. To obtain satisfactory service with emulsions, use Sperry Vickers S214 type pumps or other suitable models with separate valving.

Maximum Speed Ratings are given for three types of fluids. Speeds are influenced by specific gravity, viscosity and suction head. Pump suction and speed should be related so that vacuum at pump inlet does not exceed 5" of mercury for petroleum oil, 3" for synthetic fluid and 5" for water glycol type fluids.

Minimum Speed Rating (RPM)..... 600

### Filtration

For maximum overall efficiency and service life, filtration of 25 micron or less is recommended. For fire-resistant fluids this filtration is mandatory.

Model Numbers tabulated include GPM capacity designation of each pump and relief valve and unloading valve pressure adjustment range.

Weight Lbs. (Approx.)

Foot Mounting..... 155

Flange Mounting..... 140

Model Code

Double Pump

Combination Type

Series Size and Type of Mounting

Small Volume Pump Capacity Y, E, G, A, C, D

Combination Type

VC - 149 - D - 3 D \* - 5

Unloading Valve Pressure Range PSI

A - 75-250

B - 125-500

D - 250-1000

Relief Valve 75-1000 PSI

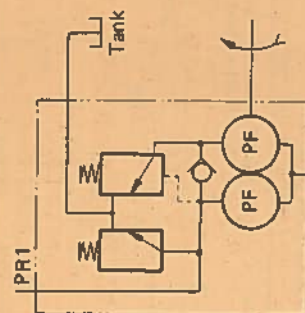
Typical Performance Data By Fluid Type Based On Operation At 1200 RPM, Fluid Temperature 120°F., Viscosity 150 SSU At 100°F. Characteristics At Other Speeds Approximately Proportional

Model Series	Drive Speed (Maximum)	Pump Flow (GPM)									
		Large Volume Pump					Small Volume Pump				
		Petro-leum	Fire-Resistant	Petro-leum	Syn-thetic	Water Glycol	Petro-leum	Syn-thetic	Water Glycol	Petro-leum	Syn-thetic
VC-128*	1500	15.4	15.4	15.4	15.4	15.4	Y-1.8	E-2.7	G-3.7	A-5.3	D-11.5
VC-138*	1200	19.5	19.5	19.5	19.5	19.5	E-2.7	E-2.7	E-2.7	E-2.7	E-2.7
VC-138U*	1200	23.0	23.0	23.0	23.0	23.0	G-3.7	G-3.7	G-3.7	G-3.7	G-3.7
VC-138X*	1200	29.9	29.9	29.9	29.9	29.9	A-5.3	A-5.3	A-5.3	A-5.3	A-5.3
VC-148*	1200	37.9	37.9	37.9	37.9	37.9	C-8.2	C-8.2	C-8.2	C-8.2	C-8.2

Small volume "D" size pumps limited to 1200 RPM with petroleum.

8.2 GPM may be obtained with "C" size small pump by limiting the synthetic fluid to a specific gravity of 1.20.

### STANDARD GRAPHICAL SYMBOLS FOR FLUID POWER DIAGRAMS



"VC" Type Double Pumps  
"Combination 3"







Drive Shaft Rotation

Drive shaft rotation and mounting arrangement is dependent upon assembly of internal parts and is ascertained by viewing the drive shaft end of pump. Right hand rotation (clockwise) is standard and is designated by the model numbers tabulated on the reverse side. Left hand rotation must be specified by adding suffix LH to model number.

Example: VC-149-D-6DD-5-LH

Fluids and Seals

Petroleum Oil with a viscosity ranging between 150 and 225 SSU at 100°F. is recommended. Refer to data sheet 1-286-S for hydraulic fluid and temperature recommendations.

Fire-Resistant Fluids

Synthetic and water glycol type fire-resistant fluids may be used, but they have high specific gravities which limit the GPM possible through any one pump housing. Exceeding this limit will produce cavitation with resultant wear and noise. Drive speed limited to 1200 RPM. Select GPM from chart below.

Synthetic Fluids (Phosphate ester fluids and its blends) as produced by responsible sources, for ratings given herein, are recommended. Select fluids with a viscosity as close as possible to that for petroleum oil described above. Specific gravity must not exceed 1.42.

Pumps are equipped with seals for use with all commonly used hydraulic fluids.

Water Glycols as produced by responsible sources, for ratings given herein, are recommended. Select fluids with a viscosity as close as possible to that for petroleum oil described above. It is recommended that temperatures for water glycols be limited to a maximum of 130°F., consistent with the viscosity recommendations.

Water-Oil Emulsions generally should not be used with these pumps. To obtain satisfactory service with emulsions, use Sperry Vickers S214 type pumps or other suitable models with separate valving.

Maximum Speed Ratings are given for three types of fluids. Speeds are influenced by specific gravity, viscosity and suction head. Pump suction and speed should be related so that vacuum at pump inlet does not exceed 5" of mercury for petroleum oil, 3" for synthetic fluid and 5" for water glycol type fluids.

Minimum Speed Rating (RPM)..... 600

Filtration

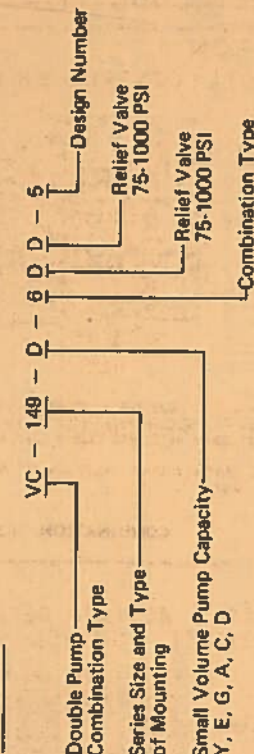
For maximum overall efficiency and service life, filtration of 25 micron or less is recommended. For fire-resistant fluids this filtration is mandatory.

Model Numbers tabulated include GPM capacity designation of each pump and relief valve pressure adjustment range.

Weight Lbs. (Approx.)

Foot Mounting..... 155  
Flange Mounting..... 140

Model Code



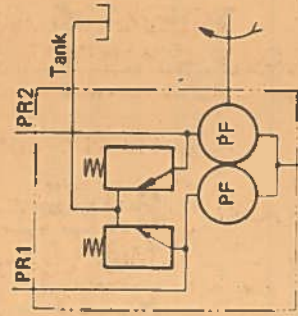
Typical Performance Data By Fluid Type Based On Operation At 1200 RPM, Fluid Temperature 120°F., Viscosity 150 SSU At 100°F. Characteristics At Other Speeds Approximately Proportional

Model Series	Drive Speed (Maximum)	Pump Flow (GPM)										Operating Pressure (Maximum)	
		Large Volume Pump					Small Volume Pump					Continuous (Intermittent)	
		Petro-leum	Fire-Resistant	Syn-thetic	Water Glycol	Petro-leum	Syn-thetic	Water Glycol	Petro-leum	Syn-thetic	Water Glycol	Petro-leum	Syn-thetic
VC-128.*	1500	15.4	15.4	15.4	15.4	Y-1.8	Y-1.8	Y-1.8	Y-1.8	Y-1.8	Y-1.8	Y-1000	Y-1000
VC-138.*	1200	19.5	19.5	19.5	19.5	E-2.7	E-2.7	E-2.7	E-2.7	E-2.7	E-2.7	E-1000	E-1000
VC-138U.*	1200	23.0	23.0	23.0	23.0	A-5.3	A-5.3	A-5.3	A-5.3	A-5.3	A-5.3	A-1000	A-1000
VC-138X.*	1200	29.9	29.9	29.9	29.9	C-8.2	C-8.2	C-8.2	C-8.2	C-8.2	C-8.2	C-1000	C-1000
VC-148.*	1200	37.9	37.9	37.9	37.9	D-11.5	D-11.5	D-11.5	D-11.5	D-11.5	D-11.5	D-1000	D-1000

See reverse side for complete model numbers and input horsepower requirements.

- When small volume pump is the 11.5 GPM "D" size, drive speed may not exceed 1200 RPM.
- Intermittent duty is defined as 10% of overall time. No one application of pressure is to exceed 10% of one minute (6 seconds). Intermittent pressure rating limited by integral valving.
- ▲ 8.2 GPM may be obtained with small volume "C" pump by limiting the synthetic fluid to a specific gravity of 1.20.

STANDARD GRAPHICAL SYMBOL FOR FLUID POWER DIAGRAMS



"VC" Type Double Pumps  
"Combination 6"

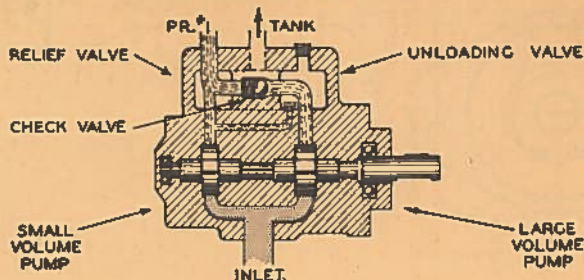


# VICKERS

## SCHEMATIC DIAGRAMS SHOWING DELIVERY CONTROL WITH VARIOUS COMBINATION TYPES OF SERIES "VC" PUMP & VALVE UNITS.

### TWO PRESSURE PUMP ACTION

#### AUTOMATIC CONTROL

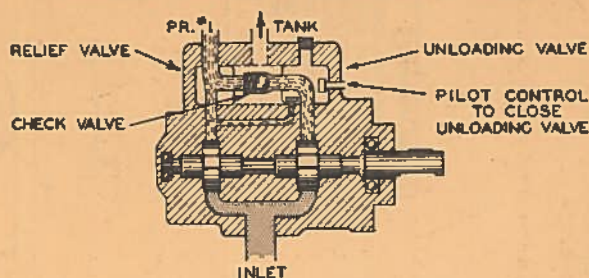


"PRESSURE #1" DELIVERS THE OIL DISCHARGE FROM BOTH PUMPS WHEN PRESSURES LOWER THAN THE UNLOADING VALVE SETTING ARE ENCOUNTERED.  
DELIVERS THE OIL DISCHARGE FROM ONLY THE SMALL VOLUME PUMP WHEN PRESSURES HIGHER THAN THE UNLOADING VALVE SETTING ARE ENCOUNTERED.  
LARGE PUMP DISCHARGE RECIRCULATES FREELY TO TANK.

REFER TO INST. DRWS.  
E-35101,-2,-3  
E-34801,-2,-3

COMBINATION 3

#### REMOTE CONTROL UNLOADING VALVE

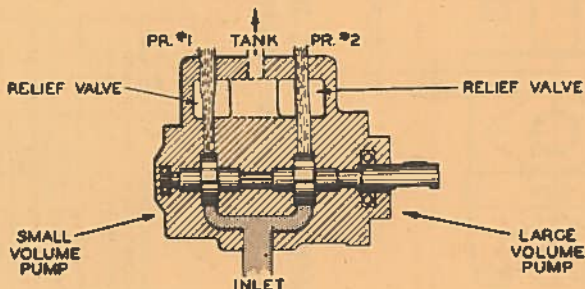


OPERATION SIMILAR TO COMBINATION #3 EXCEPT THAT DELIVERY FROM BOTH PUMPS CONTINUES SO LONG AS PRESSURE IS APPLIED AT THE AUXILIARY PILOT CONTROL CONNECTION, EVEN THOUGH PRESSURES HIGHER THAN THE UNLOADING VALVE SETTING ARE ENCOUNTERED.  
PRESSURE HELD UPON AUXILIARY PILOT CONTROL CONNECTION DELAYS UNLOADING VALVE ACTION AS REQUIRED.

COMBINATION 13

### DOUBLE PUMP ACTION

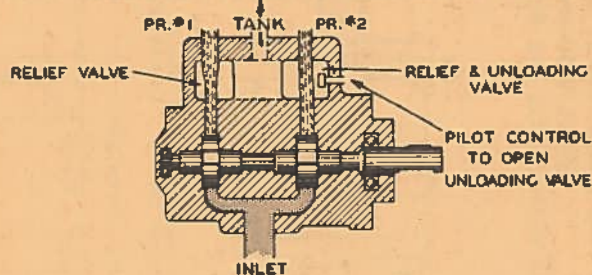
#### DIRECT ACTING RELIEF VALVES



"PRESSURE #1" OUTLET DELIVERS THE OIL DISCHARGE FROM THE SMALL VOLUME PUMP.  
"PRESSURE #2" OUTLET DELIVERS THE OIL DISCHARGE FROM THE LARGE VOLUME PUMP.

COMBINATION 8

#### DIRECT ACTING RELIEF VALVES AND REMOTE CONTROL UNLOADING VALVE

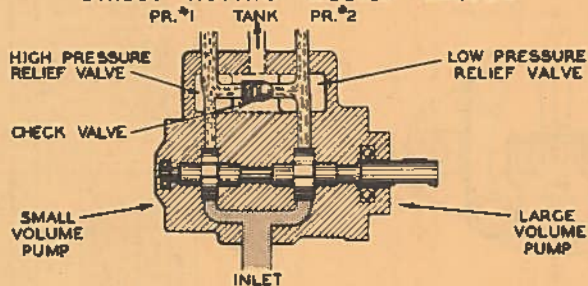


OPERATION SIMILAR TO COMBINATION #8 EXCEPT THAT DELIVERY FROM "PRESSURE #2" OUTLET MAY BE DROPPED AND THE LARGE PUMP UNLOADED TO TANK AS LONG AS PRESSURE IS APPLIED AT THE AUXILIARY PILOT UNLOADING CONNECTION. PRESSURE APPLIED AT AUXILIARY PILOT UNLOADING CONNECTION CAUSES LOW PRESSURE RELIEF VALVE TO BE HELD OPEN.

COMBINATION 16

### TWO PRESSURE & DOUBLE PUMP ACTION

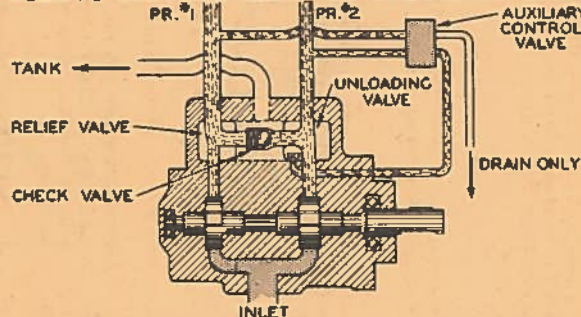
#### DIRECT ACTING RELIEF VALVES



"PRESSURE #1" OUTLET DELIVERS THE OIL DISCHARGE FROM BOTH PUMPS WHEN PRESSURES LOWER THAN THE LOW PRESSURE RELIEF VALVE SETTING ARE ENCOUNTERED. DELIVERS THE OIL DISCHARGE FROM ONLY THE SMALL VOLUME PUMP WHEN PRESSURES HIGHER THAN THE LOW PRESSURE RELIEF VALVE SETTING ARE ENCOUNTERED.  
"PRESSURE #2" OUTLET DELIVERS THE OIL DISCHARGE FROM THE LARGE VOLUME PUMP AT PRESSURES UP TO THE LOW PRESSURE RELIEF VALVE SETTING WHEN PRESSURES AT "PRESSURE #1" OUTLET ARE HIGHER.

COMBINATION 9

#### REMOTE CONTROL RELIEF OR UNLOADING VALVE



OPERATION SIMILAR TO COMBINATION #9, OR LIKE COMBINATION #9 DEPENDING UPON POSITION OF AUXILIARY CONTROL VALVE.  
PRESSURE APPLIED AT AUXILIARY PILOT CONTROL CONNECTION FROM EITHER OF THE TWO PRESSURE OUTLETS (AS DETERMINED BY THE POSITION OF AN AUXILIARY CONTROL VALVE) CAUSES LOW PRESSURE VALVE TO OPERATE EITHER AS AN UNLOADING VALVE OR AS A RELIEF VALVE.

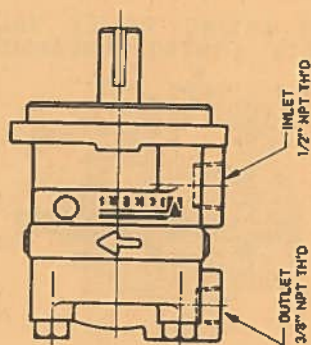
COMBINATION 23

DRAWN	5-22-45	M. C.
RELEASED	10-1-48	24

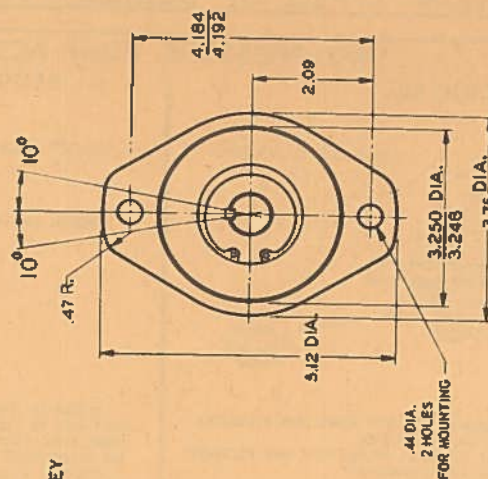
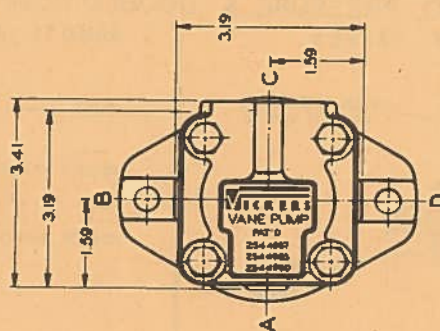
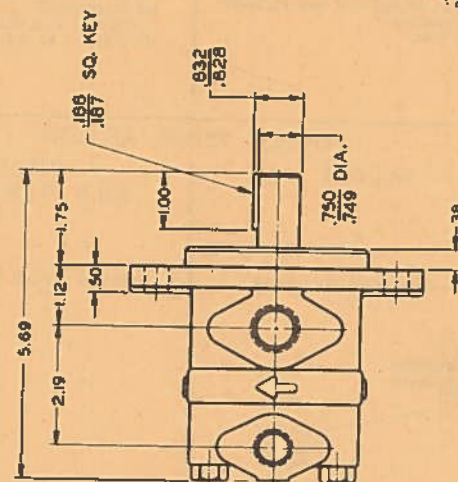
PUMPS CONSTANT DELIVERY VANE TYPE	TWO-PRESSURE	INTEGRAL DESIGN	ALL SIZES	SCHEMATIC DIAGRAMS	REF. DRWG. 211-S
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# **VICKERS. VANE TYPE CONSTANT DELIVERY SINGLE PUMPS** **SERIES V100-S214** **FOR USE WITH OIL OR FIRE RESISTANT FLUIDS**



CAUTION: AIR BLEED  
 AT TIME OF FIRST STARTING, IF  
 THE PUMP DOES NOT IMMEDIATELY  
 PRIME, AIR SHOULD BE BLED FROM  
 PUMP DELIVERY LINE. THIS MAY BE  
 ACCOMPLISHED BY LOOSENING A  
 CONNECTION IN THE DELIVERY  
 LINE CLOSE TO THE PUMP UNTIL  
 OIL FLOWS, INDICATING PUMP HAS  
 PRIMED.



## **MODEL V110-X-IC-10-S214** **(FLANGE MOUNTING)**

OUTLET, ASSEMBLED IN LINE WITH INLET,  
 IS DESIGNATED BY "C" IN MODEL NUMBER.  
 OPTIONAL LOCATIONS OF OUTLET:  
 "A" - OPPOSITE INLET.  
 "B" - 90° COUNTERCLOCKWISE FROM INLET.  
 "D" - 90° CLOCKWISE FROM INLET.

MODEL NUMBERS		OPERATING CHARACTERISTICS AT 1000 RPM DATA BASED ON PERFORMANCE AT OIL TEMPERATURE OF 100° F. VISCOSITY 150 SSU AT 100° F.												MAX. PSI WHEN USED WITH FLUID TYPES		
USE AS LISTED FOR PETROLEUM & WATER-CONTAINING FLUIDS. FOR SYNTHETIC FLUIDS ADD FT. PREFIX. SEE SYNTHETIC FLUIDS PARA- GRAPH FOR EXPLANATION.	FLANGE MOUNTING	100 PSI		500 PSI		1000 PSI		1500 PSI		PETROLEUM OIL		SYNTHETIC OIL		WATER- CONTAINING		ALL FLUIDS
		GPM	HP	GPM	HP	GPM	HP	GPM	HP							
V114-15-IC-10-S214	V110-15-IC-10-S214	1.5	0.2	1.4	0.6	1.3	1.3	1.2	2.0	1800	1800	1800	1800	1500		
V114-25-IC-10-S214	V110-25-IC-10-S214	2.4	0.2	2.3	0.9	2.2	1.9	2.1	2.8	1800	1800	1800	1800			
V114-35-IC-10-S214	V110-35-IC-10-S214	3.6	0.3	3.4	1.3	3.3	2.6	3.2	3.6	1800	1800	1800	1800			

REVISED 7-1-63 R.X.S.

**VICKERS INCORPORATED**  
 DIVISION OF SPERRY RAND CORPORATION  
 DETROIT, MICHIGAN, U.S.A.

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**I-236587**

PUMPS  
SINGLE

CONSTANT  
DELIVERY

VANE  
TYPE

1.5 TO 3.6  
G.P.M.

FOOT & FLANGE  
MOUNTING

INST. DRWG.  
I-236587





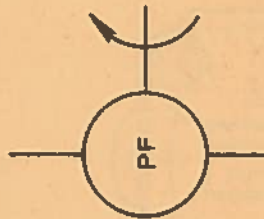
# VANE TYPE CONSTANT DELIVERY SINGLE PUMPS

## SERIES V100-S214

### FOR USE WITH OIL OR FIRE RESISTANT FLUIDS

## STANDARD GRAPHICAL SYMBOLS FOR FLUID POWER DIAGRAMS

### CONSTANT DELIVERY SINGLE PUMPS



#### CONSTRUCTION

SERIES V100-S214 PUMPS ARE OF VICKERS "BALANCED VANE TYPE" CONSTRUCTION.

#### FILTRATION

FOR MAXIMUM OVER-ALL EFFICIENCY AND SERVICE LIFE, FILTRATION OF 25 MICRON OR LESS IS RECOMMENDED. FOR FIRE RESISTANT FLUIDS THIS FILTRATION IS MANDATORY.

#### SHAFT ROTATION

PUMPS ARE NORMALLY ASSEMBLED FOR RIGHT HAND OR CLOCKWISE ROTATION AS VIEWED FROM THE SHAFT END.

IF LEFT HAND OR COUNTERCLOCKWISE ROTATION IS REQUIRED, SPECIFY BY ADDING SUFFIX "LH" TO THE MODEL NUMBER.

EXAMPLE: V110-\*\*-1C-S214-LH

#### INPUT DRIVE SPEED

MINIMUM RECOMMENDED DRIVE SPEED ..... 600 RPM

MAXIMUM SPEED RATINGS ARE TABULATED IN CHART ON FRONT PAGE FOR THREE TYPES OF FLUID. THESE ARE INFLUENCED BY SPECIFIC GRAVITY, VISCOSITY AND SUCTION HEAD. PUMP SUCTION AND SPEED SHOULD BE RELATED SO THAT VACUUM AT PUMP INLET DOES NOT EXCEED 6" OF MERCURY FOR PETROLEUM OIL, 3" FOR SYNTHETIC FLUID, AND 5" FOR WATER-CONTAINING FLUIDS.

#### FLUIDS PERMISSIBLE

PETROLEUM OIL WITH VISCOSITY RANGING BETWEEN 150 SSU AND 225 SSU AT 100°F IS RECOMMENDED. REFER TO DATA SHEET 286-S FOR RECOMMENDED OIL SPECIFICATIONS.

#### WATER-CONTAINING FLUIDS

(WATER, GLYCOLS AND WATER-IN-OIL EMULSIONS) AS PRODUCED BY RESPONSIBLE SOURCES FOR RATINGS GIVEN HEREIN ARE RECOMMENDED. SELECT FLUIDS WITH A VISCOSITY AS CLOSE AS POSSIBLE TO THAT FOR PETROLEUM OIL DESCRIBED ABOVE. SPECIFIC GRAVITY MUST NOT EXCEED 1.3. (SEE BULLETIN 59-73)

#### SYNTHETIC FLUIDS

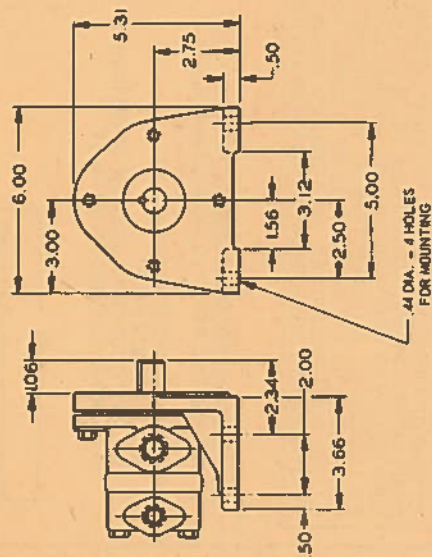
(PHOSPHATE ESTERS AND PHOSPHATE ESTER BASE FLUIDS) AS PRODUCED BY RESPONSIBLE SOURCES FOR RATINGS GIVEN HEREIN ARE RECOMMENDED. SELECT FLUIDS WITH A VISCOSITY AS CLOSE AS POSSIBLE TO THAT FOR PETROLEUM OIL DESCRIBED ABOVE. SPECIFIC GRAVITY MUST NOT EXCEED 1.3. (SEE BULLETIN 59-73)

PUMPS FOR USE WITH SYNTHETIC FLUIDS REQUIRE SEALS MADE OF DIFFERENT MATERIAL. TO OBTAIN PUMPS EQUIPPED WITH THESE SPECIAL SEALS ADD PREFIX "P1" TO MODEL NUMBER.

EXAMPLE: EV110-\*\*-1C-S214

#### WEIGHT

MODEL V110-\*\*-1C-S214 (FLANGE MOUNTING) ..... APPROX. 8 LBS.  
MODEL V114-\*\*-1C-S214 (FOOT MOUNTING) ..... APPROX. 13 LBS.

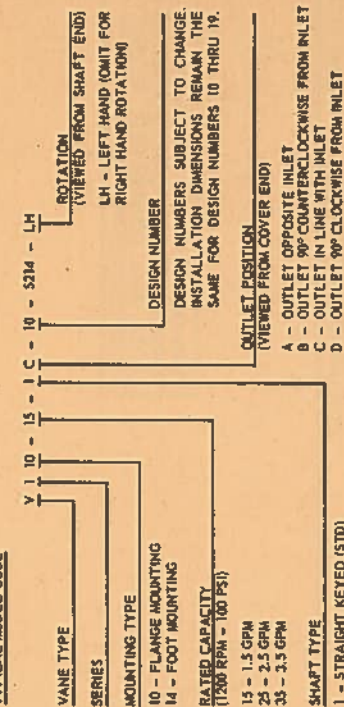


MAY BE ASSEMBLED IN ANY ONE OF FOUR POSITIONS

## MODEL V114-X-1C-10-S214

### (FOOT MOUNTING)

#### TYPICAL MODEL CODE





**MODEL SERIES V200-S214  
FIXED DISPLACEMENT  
FOR USE WITH OIL OR FIRE RESISTANT FLUIDS**

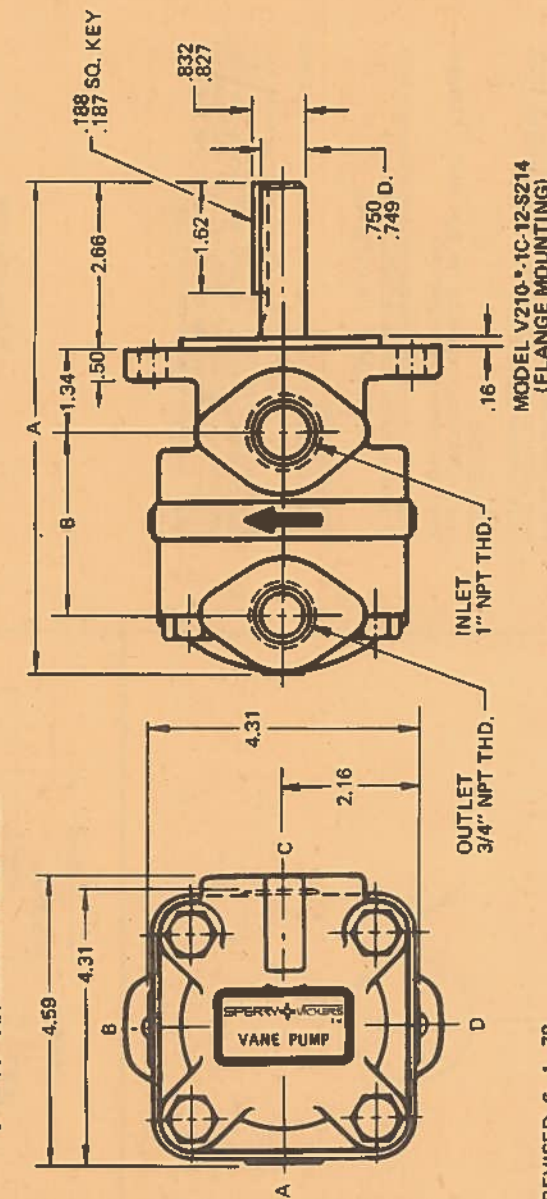
**AIR BLEED**  
AT THE TIME OF FIRST STARTING, IF THE PUMP DOES NOT IMMEDIATELY PRIME, AIR SHOULD BE BLED FROM THE PUMP DELIVERY LINE. THIS MAY BE ACCOMPLISHED BY LOOSENING A CONNECTION IN THE DELIVERY LINE CLOSE TO THE PUMP UNTIL OIL FLOWS, INDICATING PUMP HAS PRIMED. AN AIRBLEED VALVE IS AVAILABLE FOR THIS PURPOSE. SEE DRAWING 521601.

OUTLET, ASSEMBLED IN LINE WITH INLET, IS DESIGNATED BY "C" IN MODEL NUMBER.

**OPTIONAL LOCATIONS OF OUTLET:**

"A" - OPPOSITE INLET.  
 "B" - 90° COUNTERCLOCKWISE FROM INLET.  
 "D" - 90° CLOCKWISE FROM INLET

**PUMP DRIVE - PUMP IS RECOMMENDED FOR DIRECT COAXIAL DRIVE. IF DRIVES IMPOSING RADIAL SHAFT LOADS ARE CONSIDERED, CONSULT THE SPERRY VICKERS SALES REPRESENTATIVE.**



REVISÉ 6-1-78

MODEL NUMBERS		● TYPICAL OPERATING CHARACTERISTICS AT 1200 RPM DATA BASED ON PERFORMANCE AT OIL TEMPERATURE OF 120° F. VISCOSITY 150 SSU AT 100° F.												MAXIMUM SPEED (RPM) WHEN USED WITH FLUID TYPES INDICATED			DIMEN- SIONS		MAX. PRESSURE (PSI) WHEN USED WITH FLUID TYPES INDICATED				
FACE MOUNTING	FOOT MOUNTING	FLANGE MOUNTING	100 PSI			500 PSI			1000 PSI			1500 PSI			2000 PSI			PETROLEUM OIL	SYNTHETIC	WATER- CONTAINING	PETROLEUM AND SYNTHETIC	WATER- CONTAINING	
			GPM	HP	HP	GPM	HP	GPM	HP	GPM	HP	GPM	HP	GPM	HP	GPM	HP						
V230-2-1C-12-S214	V214-2-1C-12-S214	V210-2-1C-12-S214	2.3	0.4	2.1	1.2	1.9	2.1	1.8	3.1	1.6	4.0	1800	1800	1800	7.62	2.69	2000	1500				
V230-5-1C-12-S214	V214-5-1C-12-S214	V210-5-1C-12-S214	5.4	0.5	5.0	2.2	4.7	4.1	4.5	6.1	4.3	8.2	1800	1800	1800	2.94							
V230-6-1C-12-S214	V214-6-1C-12-S214	V210-6-1C-12-S214	6.6	0.6	6.0	2.6	5.8	4.9	5.4	7.2	5.2	9.4	1800	1800	1800								
V230-8W-1C-12-S214	V214-8W-1C-12-S214	V210-8W-1C-12-S214	8.0	0.7	7.6	3.0	7.2	5.7	6.9	8.4	6.6	11.0	1800	1200	1800		7.88						
V230-9W-1C-12-S214	V214-9W-1C-12-S214	V210-9W-1C-12-S214	9.0	0.9	8.4	3.6	8.2	7.0	8.1	10.2	7.7	13.5	1800	1200	1800	8.06	3.12	2000	1500				
V230-11W-1C-12-S214	V214-11W-1C-12-S214	V210-11W-1C-12-S214	10.9	1.2	10.2	4.2	9.7	8.0	9.3	11.8	8.9	16.0	1800	1200	1800	8.06	3.12						
● WHEN DISCHARGE PRESSURE IS BELOW 100 PSI, PUMP DELIVERY IS REDUCED APPROXIMATELY 10 TO 15 PER CENT.																						502100	

● WHEN DISCHARGE PRESSURE IS BELOW 100 PSI, PUMP DELIVERY IS REDUCED APPROXIMATELY 10 TO 15 PER CENT.

502100



**CONSTRUCTION**  
SERIES V200-S214 PUMPS ARE OF SPERRY VICKERS "BALANCED VANE TYPE" CONSTRUCTION.

**FILTRATION**  
FOR MAXIMUM OVER-ALL EFFICIENCY AND SERVICE LIFE, FILTRATION OF 25 MICRON OR LESS IS RECOMMENDED. FOR FIRE RESISTANT FLUIDS THIS FILTRATION IS MANDATORY.

**SHAFT ROTATION**  
PUMPS ARE NORMALLY ASSEMBLED FOR RIGHT HAND OR CLOCKWISE ROTATION AS VIEWED FROM THE SHAFT END.

IF LEFT HAND OR COUNTERCLOCKWISE ROTATION IS REQUIRED, SPECIFY BY ADDING SUFFIX "LH" TO THE MODEL NUMBER.

EXAMPLE: V210-2-1C-12-S214-LH

**INPUT DRIVE SPEED**  
MINIMUM RECOMMENDED DRIVE SPEED..... 600 RPM  
MAXIMUM SPEED RATINGS ARE TABULATED IN CHART ON FRONT PAGE FOR THREE TYPES OF FLUID. THESE ARE INFLUENCED BY SPECIFIC GRAVITY, VISCOSITY AND SUCTION HEAD. PUMP SUCTION AND SPEED SHOULD BE RELATED SO THAT VACUUM AT PUMP INLET DOES NOT EXCEED 6" OF MERCURY FOR PETROLEUM OIL 3" FOR SYNTHETIC FLUID, AND 5" FOR WATER-CONTAINING FLUIDS. MAXIMUM INLET PRESSURE 20 PSI.

**FLUIDS PERMISSIBLE**  
PETROLEUM OIL MEETING PERFORMANCE CLASSIFICATION LETTER DESIGNATIONS SC, SD OR SE OF SAE J183 WITH VISCOSITY RANGING BETWEEN 150 SSV AND 225 SSV AT 100° F. IS RECOMMENDED. REFER TO DATA SHEET 1-286-S FOR HYDRAULIC FLUID AND TEMPERATURE RECOMMENDATIONS.

**WATER-CONTAINING FLUIDS**  
(WATER GLYCOLS AND WATER-IN-OIL EMULSIONS) AS PRODUCED BY RESPONSIBLE SOURCES FOR RATINGS GIVEN HEREIN ARE RECOMMENDED. SELECT FLUIDS WITH A VISCOSITY AS CLOSE AS POSSIBLE TO THAT FOR PETROLEUM OIL DESCRIBED ABOVE.

**SYNTHETIC FLUIDS**  
PHOSPHATE ESTER TYPE FIRE RESISTANT FLUIDS AND ITS BLENDS AS PRODUCED BY RESPONSIBLE SOURCES FOR RATINGS GIVEN HEREIN ARE RECOMMENDED. SELECT FLUIDS WITH A VISCOSITY AS CLOSE AS POSSIBLE TO THAT FOR PETROLEUM OIL DESCRIBED ABOVE. SPECIFIC GRAVITY MUST NOT EXCEED 1.3.

PUMPS FOR USE WITH SYNTHETIC FLUIDS REQUIRE SEALS MADE OF DIFFERENT MATERIAL. TO OBTAIN PUMPS EQUIPPED WITH THESE SPECIAL SEALS ADD PREFIX "F3" TO MODEL NUMBER.

EXAMPLE: F3-V210-2-1C-12-S214

**INTERCHANGEABILITY**  
MODEL V230 FACE MOUNTING WILL MOUNT IN PLACE OF MODEL V-111. SHAFT DIMENSIONS AND PORT LOCATIONS DIFFER.

WEIGHT LBS. (APPROX.)

V210\*-1C-12-S214 (FLANGE MOUNTING)..... 18  
V214\*-1C-12-S214 (FOOT MOUNTING)..... 23  
V230\*-1C-12-S214 (FACE MOUNTING)..... 18

**TYPICAL MODEL CODE**

F3 - V 2 10 - 2 - 1 C - 12 - S214 - LH

SPECIAL SEALS SEE FLUIDS NOTE

VANE TYPE

SERIES

MOUNTING TYPE

10 - FLG. MTG.

14 - FOOT MTG.

20 - FACE MTG.

FOR SEPARATE "FOOT BRACKET KIT" ORDER

MODEL FB-A-10

RATED CAPACITY (1200 RPM - 100 PSI)

2 - 2 GPM

5 - 5 GPM

6 - 6 GPM

8W - 8 GPM

9W - 9 GPM

11W - 11 GPM

DESIGN NUMBER

SUBJECT TO CHANGE. INSTALLATION DIMENSIONS REMAIN THE SAME FOR DESIGN NUMBERS 10 THRU 19.

OUTLET POSITION

(VIEWED FROM COVER END)

A - OUTLET OPPOSITE INLET

B - OUTLET 90° COUNTERCLOCKWISE FROM INLET

C - OUTLET IN LINE WITH INLET

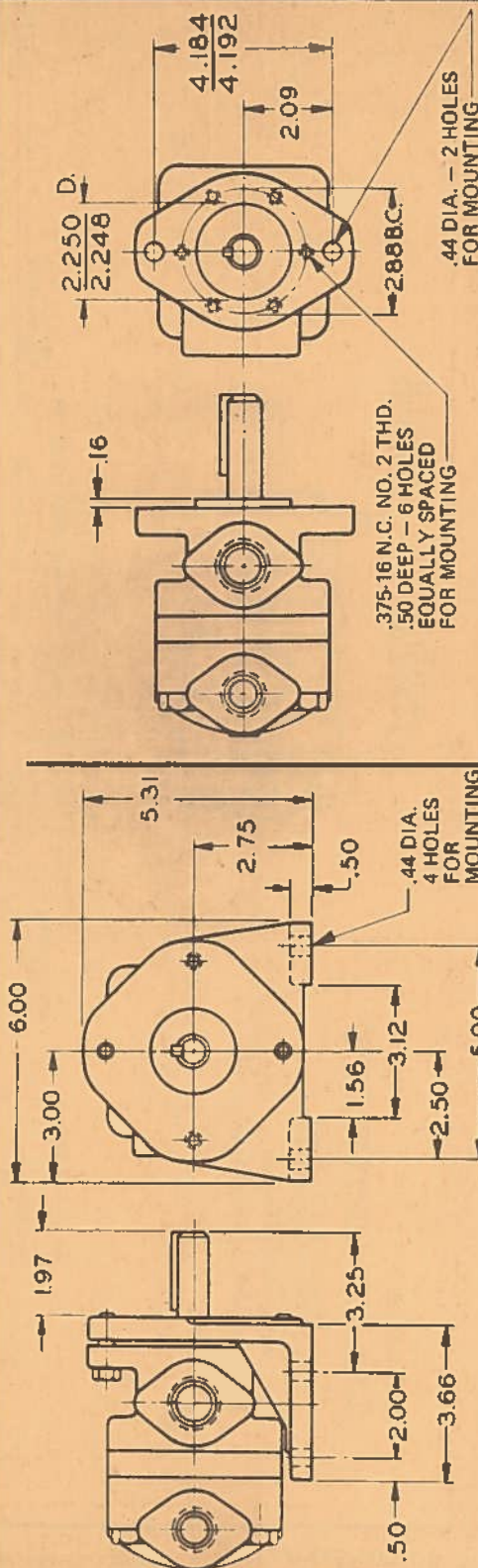
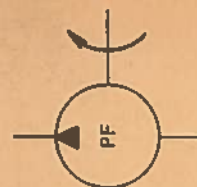
D - OUTLET 90° CLOCKWISE FROM INLET

SHAFT TYPE

1 - STRAIGHT KEYED (STD.)

ROTATION (VIEWED FROM SHAFT END)  
LH - LEFT HAND (OMIT FOR RIGHT HAND ROTATION)

STANDARD GRAPHICAL SYMBOLS FOR FLUID POWER DIAGRAMS



MAY BE ASSEMBLED IN ANY ONE OF FOUR POSITIONS

MODEL V214\*-1C-12-S214  
(FOOT MOUNTING)

MODEL V230\*-1C-12-S214  
(FACE MOUNTING)

502100-1

SEC. b



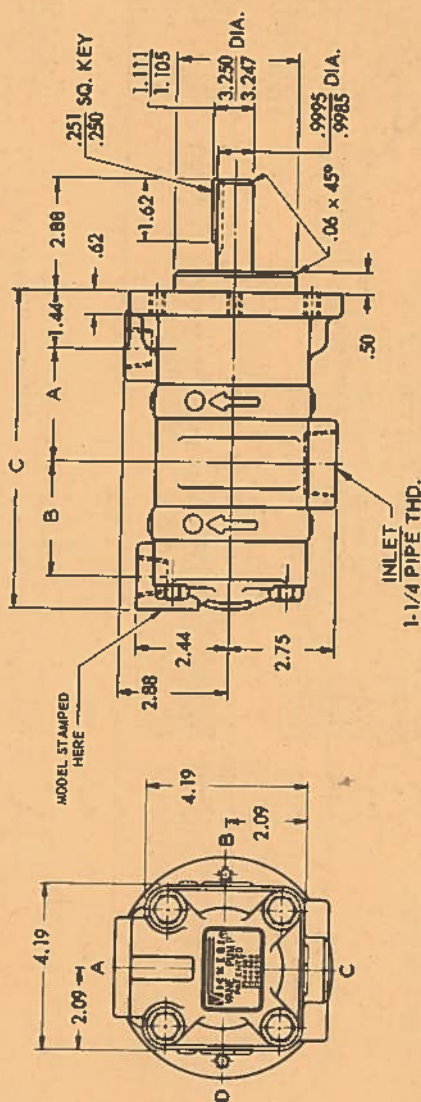
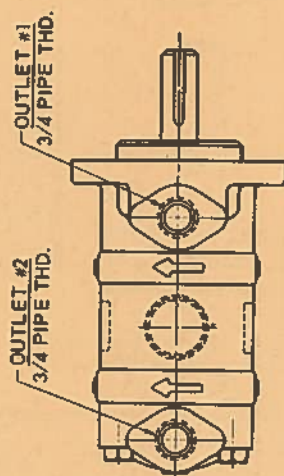
**PUMPS  
DOUBLE**

## PRESSURE OUTLETS

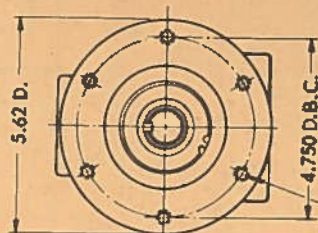
OPTIONAL LOCATIONS OF PRESSURE OUTLETS (VIEWED FROM HEAD END) ARE DESIGNATED ON THE DRAWING AS:

- A - OPPOSITE THE INLET (AS SHOWN)  
B - 90° COUNTERCLOCKWISE FROM INLET  
C - IN LINE WITH INLET  
D - 90° CLOCKWISE FROM INLET

SEE MODEL CODE FOR ADDITIONAL INFORMATION.



VZ30.00-1A-20-5214  
(FACE MOUNTING)



**375-16 N.C.-28 THD-.75 DEEP  
6 HOLES EQUALLY SPACED  
FOR MOUNTING**

PUMP MODEL NUMBER	DIMENSIONS			MAXIMUM SPEED (RPM) WITH FLUID TYPES INDICATED		MAXIMUM PSI WITH FLUID TYPES INDICATED			
						SHAFT END OF PUMP		HEAD END OF PUMP	
	A	B	C	SYNTHETIC	PETROLEUM & WATER CONTAINING	SYNTHETIC	PETROLEUM & WATER CONTAINING	PETROLEUM & SYNTHETIC	
V223*-3.2-1AA-20-S214									
V223*-5.5-1AA-20-S214	2.69	2.69	7.72	1800					
V223*-5.5-1AA-20-S214									
V223*-2.8W-1AA-20-S214	2.69	2.94	7.94						
V223*-5.9W-1AA-20-S214									
V223*-8W-1AA-20-S214	2.94	2.94	8.22			1500	1500	2000	
V223*-2.11W-1AA-20-S214				1200					
V223*-5.11W-1AA-20-S214	2.69	3.12	8.16						
V223*-8W-11W-1AA-20-S214	2.94	3.12	8.41						
V223*-1.11W-1AA-20-S214	2.94	3.12	8.41			1200	1000	1000	

OPERATING CHARACTERISTICS AT 1200 RPM  
CHARACTERISTICS AT OTHER DRIVE SPEEDS  
ARE APPROXIMATELY PROPORTIONAL TO RPM)

DATA BASED ON PERFORMANCE AT  
OIL TEMPERATURE OF 120° F

RING SIZE	VISCOSITY 150 SSU AT 100° F											
	100 PSI	500 PSI	1000 PSI	1500 PSI	2000 PSI	2500 PSI	3000 PSI	3500 PSI	4000 PSI	4500 PSI	5000 PSI	5500 PSI
2	2.3	0.4	2.2	1.3	1.9	2.2	1.6	3.1	1.5	1.8		
5	3.5	0.7	5.0	2.6	4.8	4.1	4.7	6.0	4.3	6.2		
8W	7.9	0.8	7.5	3.5	7.2	5.7	6.9	8.4	6.7	11.0		
11	10.9	1.2	10.2	4.3	9.7	8.1	9.2	11.4	8.9	15.5		
11W	10.9	1.2	10.2	4.3	9.7	8.1	9.2	11.4	8.9	15.5		

## IMPLICIT HYDROPOWER

REQUIRED INPUT HORSEPOWER IS THE SUM OF INPUT HORSEPOWER REQUIRED FOR EACH RING SIZE SELECTED.

REVISED	2-20-62	D.W.S.
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**VICKERS INCORPORATED**  
DIVISION OF SUPPLY RAND CORPORATION  
DETROIT, MICHIGAN, U.S.A.

**INSTALLATION DRAWING**

ENGINEERING DESIGNED	9 - 29 - 61	D.W.S.
CHECKED	8 - 24 - 61	D.W.
MADE	8 - 24 - 61	D.W.

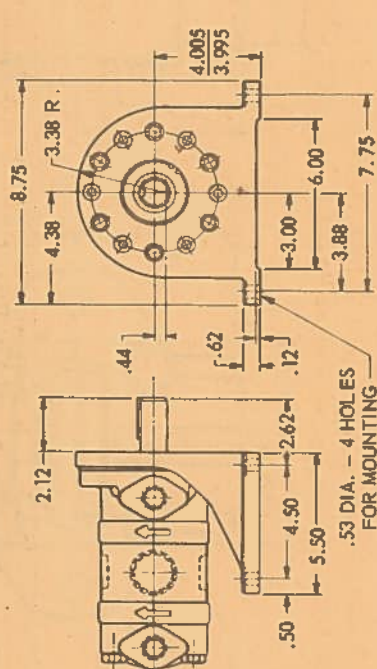
**1-248700**



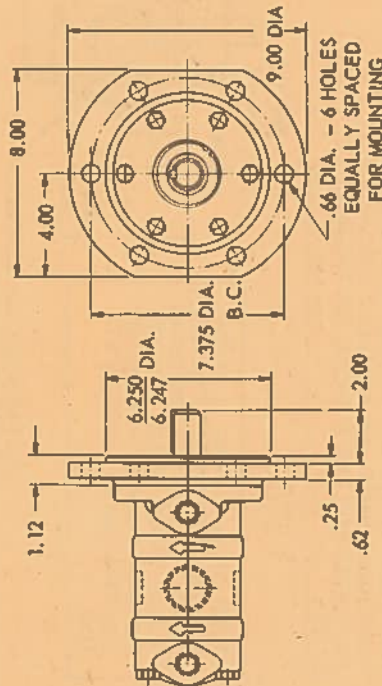
# VICKERS® VANE TYPE CONSTANT DELIVERY DOUBLE PUMPS

SERIES V2200-S214

FOR USE WITH OIL OR FIRE RESISTANT FLUIDS



V2234-S-1AA-20-S214  
(FOOT MOUNTING)



V2235-S-1AA-20-S214  
(FLANGE MOUNTING)

## ROTATION

RIGHT HAND ROTATION (VIEWED FROM DRIVESHAFT END) IS STANDARD ON THESE MODELS.

LEFT HAND ROTATION MAY BE SPECIFIED BY ADDING MODEL SUFFIX "LH."

EXAMPLE: V2230-2-5-1AA-20-S214-LH.

INLET AND OUTLET PORTS REMAIN AS SHOWN REGARDLESS OF DIRECTION OF SHAFT ROTATION. CHANGE OF INTERNAL ASSEMBLY IS NECESSARY WHEN CHANGE OF DRIVESHAFT ROTATION IS REQUIRED.

## INPUT DRIVE SPEED

MINIMUM RECOMMENDED DRIVE SPEED..... 600 RPM

MAXIMUM SPEED RATINGS ARE TABULATED FOR THREE TYPES OF FLUID. DRIVE SPEED IS INFLUENCED BY SPECIFIC GRAVITY, VISCOSITY, AND SUCTION HEAD. PUMP Suction AND SPEED SHOULD BE RELATED SO THAT VACUUM AT PUMP INLET DOES NOT EXCEED 6" OF MERCURY FOR PETROLEUM OIL, 3" FOR SYNTHETIC FLUID, AND 5" FOR WATER-CONTAINING FLUIDS.

## FLUIDS PERMISSIBLE

PETROLEUM OIL WITH VISCOSITY RANGING BETWEEN 150 SSU AND 225 SSU AT 100° F IS RECOMMENDED. REFER TO DATA SHEET 286-S FOR RECOMMENDED OIL SPECIFICATIONS.

WATER-CONTAINING FLUIDS (WATER GLYCOLS AND WATER-IN-OIL EMULSIONS) AS PRODUCED BY RESPONSIBLE SOURCES, FOR RATINGS GIVEN HEREIN, ARE RECOMMENDED. SELECT FLUIDS WITH A VISCOSITY AS CLOSE AS POSSIBLE TO THAT FOR PETROLEUM OIL DESCRIBED ABOVE.

SYNTHETIC FLUIDS (PHOSPHATE ESTERS AND PHOSPHATE ESTER BASE FLUIDS) AS PRODUCED BY RESPONSIBLE SOURCES, FOR RATINGS GIVEN HEREIN, ARE RECOMMENDED. SELECT FLUIDS WITH A VISCOSITY AS CLOSE AS POSSIBLE TO THAT FOR PETROLEUM OIL DESCRIBED ABOVE. SPECIFIC GRAVITY MUST NOT EXCEED 1.3. (SEE BULLETIN 99-73.)

PUMPS FOR USE WITH SYNTHETIC FLUIDS REQUIRE SEALS MADE OF DIFFERENT MATERIAL. TO OBTAIN PUMPS EQUIPPED WITH THESE SPECIAL SEALS ADD PREFIX "P1" TO MODEL NUMBER.

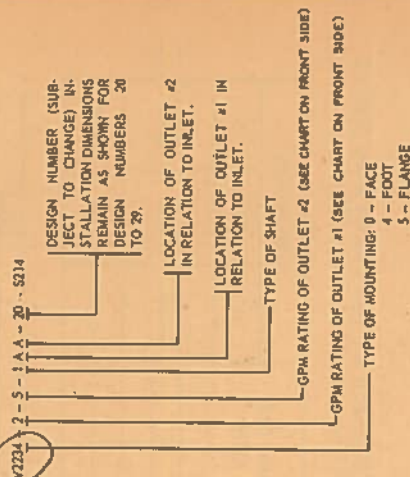
EXAMPLE: FIV2230-2-5-1AA-20-S214.

## INTERCHANGEABILITY

MODEL V2234 FOOT MOUNTING AND SHAFT INSTALLATION IS INTERCHANGEABLE WITH MODEL V-128-S-20. KEYWAYS AND PORT LOCATIONS DIFFER.

MODEL V2235 FLANGE MOUNTING AND SHAFT INSTALLATION IS INTERCHANGEABLE WITH MODEL V-128-S-20. KEYWAYS AND PORT LOCATIONS DIFFER.

## EXAMPLE OF MODEL NUMBER



## WEIGHT

MODEL V2230 (FACE MOUNTING)..... APPROX. 32 LB.  
MODEL V2234 (FOOT MOUNTING)..... APPROX. 43-1/2 LB.  
MODEL V2235 (FLANGE MOUNTING)..... APPROX. 41-1/2 LB.



**SPERRY-VICKERS**

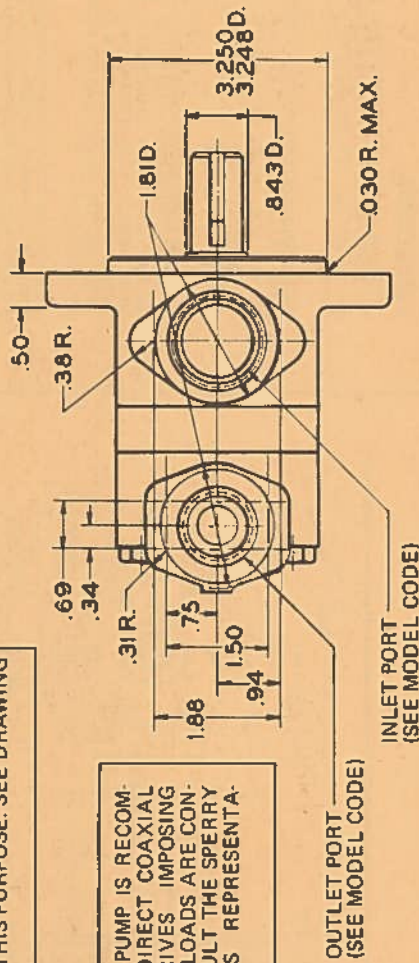
**HIGH PERFORMANCE  
SINGLE PUMPS**

SERIES V10  
FIXED DISPLACEMENT - VANE TYPE  
FOR USE WITH OIL OR FIRE RESISTANT FLUIDS

**AIR BLEED**

AT TIME OF FIRST STARTING, IF THE PUMP DOES NOT IMMEDIATELY PRIME, AIR SHOULD BE BLED FROM PUMP DELIVERY LINE. THIS MAY BE ACCOMPLISHED BY LOOSENING A CONNECTION IN THE DELIVERY LINE CLOSE TO THE PUMP UNTIL OIL FLOWS, INDICATING THE PUMP HAS PRIMED. AN AIRBLEED VALVE IS AVAILABLE FOR THIS PURPOSE. SEE DRAWING 521601.

PUMP DRIVE - PUMP IS RECOMMENDED FOR DIRECT COAXIAL DRIVE. IF DRIVES IMPOSING RADIAL SHAFT LOADS ARE CONSIDERED, CONSULT THE SPERRY VICKERS SALES REPRESENTATIVE.

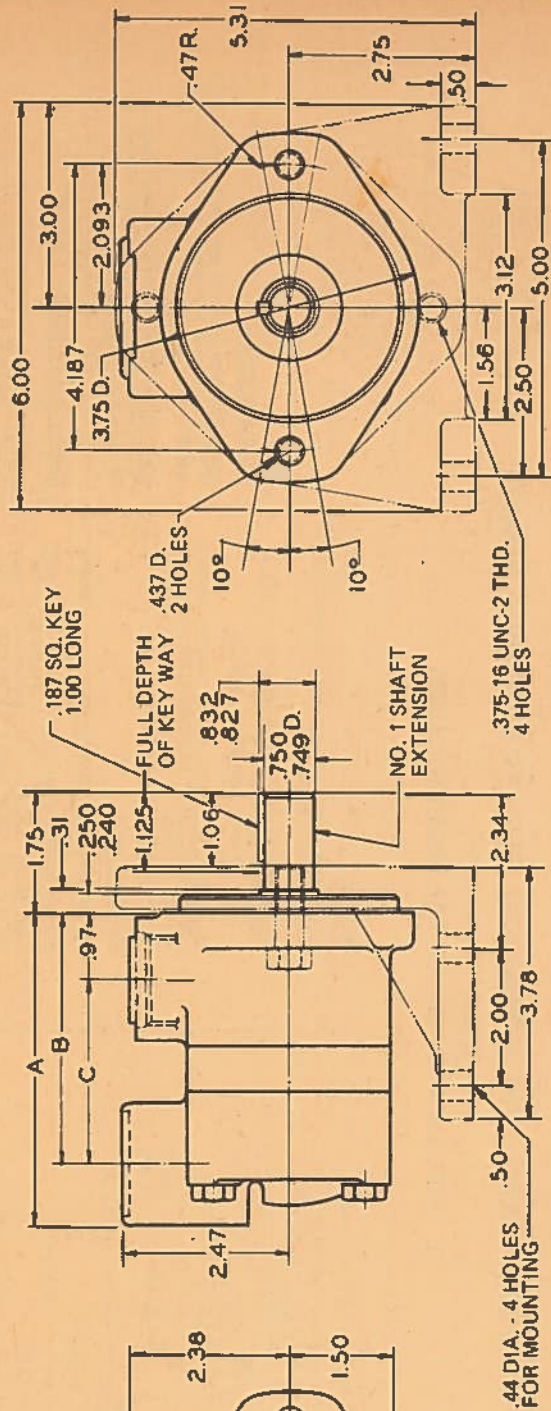


INLET PORT  
(SEE MODEL CODE)

OUTLET PORT  
(SEE MODEL CODE)

DIMENSIONS A, B & C VARY WITH RING SIZE AS TABULATED:

RING SIZE GPM	DIMENSION		
	A	B	C
1			
2	4.55	3.62	2.65
3			
4	4.80	3.87	2.90
5			



NOTE:  
PUMP MAY BE ASSEMBLED ON FOOT MOUNTING IN ANY ONE OF FOUR POSITIONS.

REVISED 5-1-77

502000

**SPERRY-VICKERS**  
TROY, MICHIGAN 48084

PUMPS  
SINGLE

FIXED  
DISPLACEMENT

VANE TYPE  
SERIES V10

NOMINAL  
1 TO 5 GPM

2-BOLT FLANGE  
OR FOOT MOUNTING

DWG. NO.  
502000



**CONSTRUCTION**  
SERIES V10 PUMPS ARE OF SPERRY VICKERS "BALANCED VANE TYPE" CONSTRUCTION.  
**FILTRATION**  
FOR MAXIMUM OVER-ALL EFFICIENCY AND SERVICE LIFE, FILTRATION OF 25 MICRON OR LESS IS RECOMMENDED. FOR FIRE RESISTANT FLUIDS THIS FILTRATION IS MANDATORY.

**SHAFT ROTATION**  
PUMPS ARE NORMALLY ASSEMBLED FOR RIGHT HAND OR CLOCKWISE ROTATION AS VIEWED FROM THE SHAFT END.  
IF LEFT HAND OR COUNTERCLOCKWISE ROTATION IS REQUIRED, SPECIFY BY ADDING SUFFIX "L" TO THE MODEL NUMBER.  
EXAMPLE: V10-1P5S-1C10-L

INLET AND OUTLET PORTS REMAIN THE SAME REGARDLESS OF DIRECTION OF SHAFT ROTATION. CHANGE OF ASSEMBLY OF INTERNAL PARTS IS NECESSARY WHEN CHANGE OF SHAFT ROTATION IS REQUIRED.

**INPUT DRIVE SPEED**  
MAXIMUM - RPM (ALL FLUIDS) ..... 1800  
MINIMUM - RPM ..... 600

SPECIFIC GRAVITY, VISCOSITY, PUMP SUCTION AND SPEED SHOULD BE RELATED SO THAT VACUUM AT PUMP INLET DOES NOT EXCEED 5" OF MERCURY FOR PETROLEUM OIL, WATER-IN-OIL EMULSIONS AND WATER GLYCOL, AND 3" FOR SYNTHETIC FIRE RESISTANT FLUIDS.

**MAXIMUM OPERATING PRESSURE - PSI**  
PETROLEUM OIL ..... 2250  
SYNTHETIC ..... 2000  
WATER-GLYCOL ..... 1800  
WATER-IN-OIL EMULSION ..... 1500  
MAXIMUM INLET PRESSURE (PSI) ..... 20

**CAPACITY**  
SERIES V10 PUMPS ARE AVAILABLE WITH FLOW CAPACITIES AS SHOWN IN THE FOLLOWING CHART:

MODEL NUMBERS USE AS LISTED FOR PETROLEUM AND WATER CONTAINING FLUIDS. FOR SYNTHETIC FLUIDS, SEE SYN- THETIC FLUIDS PARAGRAPH ABOVE.		TYPICAL OPERATING CHARACTERISTICS AT 1200 RPM. DATA BASED ON PERFORMANCE AT OIL TEMPERATURE OF 120° F. VISCOSITY 150 SSU AT 100° F.					
		100 PSI		1000 PSI		2250 PSI	
FLANGE	FOOT	RING SIZE		INPUT		INPUT	
		GPM	HP	GPM	HP	GPM	HP
V10-1P1*-1C10	V10-2P1*-1C10	1	.3	.7	.8	.6	1.6
V10-1P2*-1C10	V10-2P2*-1C10	2	.3	1.8	1.75	1.6	3.8
V10-1P3*-1C10	V10-2P3*-1C10	3	.4	2.8	2.2	2.6	5.0
V10-1P4*-1C10	V10-2P4*-1C10	4	.4	3.7	3.0	3.5	6.5
V10-1P5*-1C10	V10-2P5*-1C10	5	.6	4.8	3.6	4.5	7.8

**FLUIDS**  
PETROLEUM OILS - USE ANTIWEAR TYPE HYDRAULIC OILS OR SAE 10W OILS MEETING A.P.I. SERVICE CLASSIFICATION "MS". (SEE "OIL RECOMMENDATION SHEET 286-S" FOR DETAILS.) VISCOSITY OF OIL AT 100° F. SHOULD BE 150-225 SUS. MAXIMUM OIL TEMPERATURE OF 150° F. IS RECOMMENDED.

WATER CONTAINING FLUIDS - WATER GLYCOLS AND WATER-IN-OIL EMULSIONS, AS PRODUCED BY RESPONSIBLE SOURCES FOR RATINGS GIVEN HEREIN, ARE RECOMMENDED. SELECT FLUIDS WITH A VISCOSITY AS CLOSE AS POSSIBLE TO THAT OF PETROLEUM OIL DESCRIBED ABOVE. IT IS RECOMMENDED THAT TEMPERATURES FOR WATER BASE FLUIDS BE LIMITED TO A MAXIMUM OF 130° F.

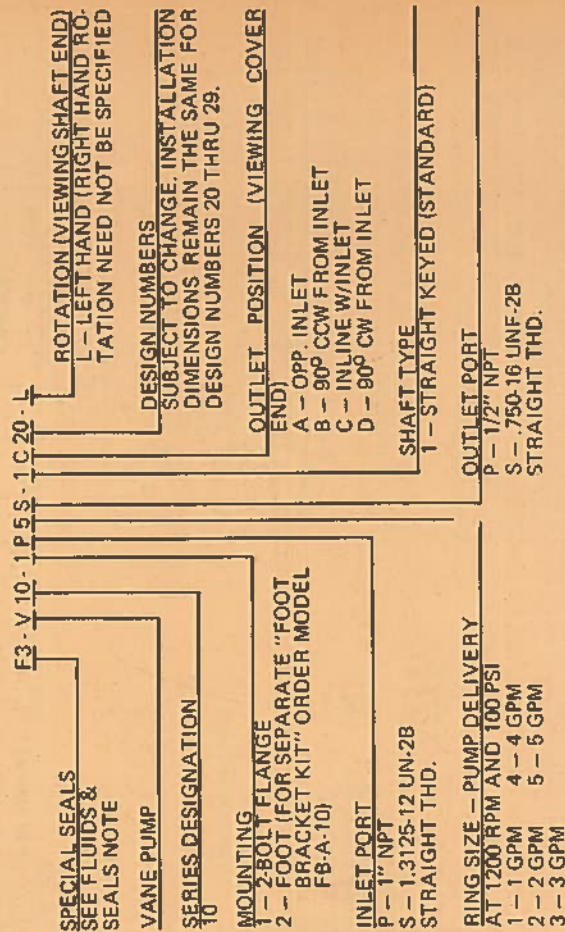
SYNTHETIC FIRE RESISTANT FLUIDS - PHOSPHATE ESTERS, CHLORINATED HYDROCARBONS, AND BLENDS AS PRODUCED BY RESPONSIBLE SOURCES FOR RATINGS GIVEN HEREIN ARE RECOMMENDED. SELECT FLUIDS WITH VISCOSITY AS CLOSE AS POSSIBLE TO THAT FOR PETROLEUM OIL DESCRIBED BELOW. MAXIMUM SPECIFIC GRAVITY OF 1.3 IS SUGGESTED. THE FLUID MUST BE COMPATIBLE WITH PUMP SEALS OF FLUOROCARBON ELASTOMERS (i.e., VITON, ETC.). TO OBTAIN PUMPS EQUIPPED FOR OPERATION WITH SYNTHETIC FIRE RESISTANT FLUIDS, ADD THE PREFIX "F3" TO THE MODEL NUMBER. EXAMPLE: F3-V10-1P5S-1C10

**ELECTRIC MOTOR PUMPS**  
MANY MOTOR MANUFACTURERS ARE PREPARED TO FURNISH DRIP PROOF OR TOTAL-LY ENCLOSED MOTORS WITH END BELLS ON WHICH THIS PUMP CAN BE MOUNTED. SUBMIT INSTALLATION DRAWING TO MOTOR MANUFACTURER.

**WEIGHT LBS. (APPROX.)**  
FLANGE ..... 8  
FOOT ..... 13

**ORDERING INSTRUCTIONS**  
SELECT PUMPS ACCORDING TO THE MODEL CODE EXPLANATION SHOWN BELOW. STANDARD OPTIONS ARE LISTED.

**MODEL CODE EXPLANATION:**



STANDARD GRAPHICAL SYMBOL FOR FLUID POWER DIAGRAMS



**Pump Drive** — Pump is recommended for direct coaxial drive. If drives imposing radial shaft loads are considered, consult your local Sperry Vickers representative.

**SERIES V20  
FIXED DISPLACEMENT - VANE TYPE  
FOR USE WITH OIL OR FIRE RESISTANT FLUIDS**

## Air Bleed

At time of first starting, if the pump does not immediately prime, air should be bled from pump delivery line. This may be accomplished by loosening a connection in the delivery line close to the pump until oil flows, indicating pump has primed. An airbled valve is available for this purpose. See drawing 521601.

Dimensions A, B & C vary with ring size as tabulated:

Ring Size	Dimension		
	A	B	C
6 GPM	4.93	4.02	2.80
7 & 8 GPM	5.18	4.27	3.05
9 GPM	5.18	4.27	3.05
11 GPM	5.38	4.47	3.25
12 & 13 GPM	5.52	4.61	3.39

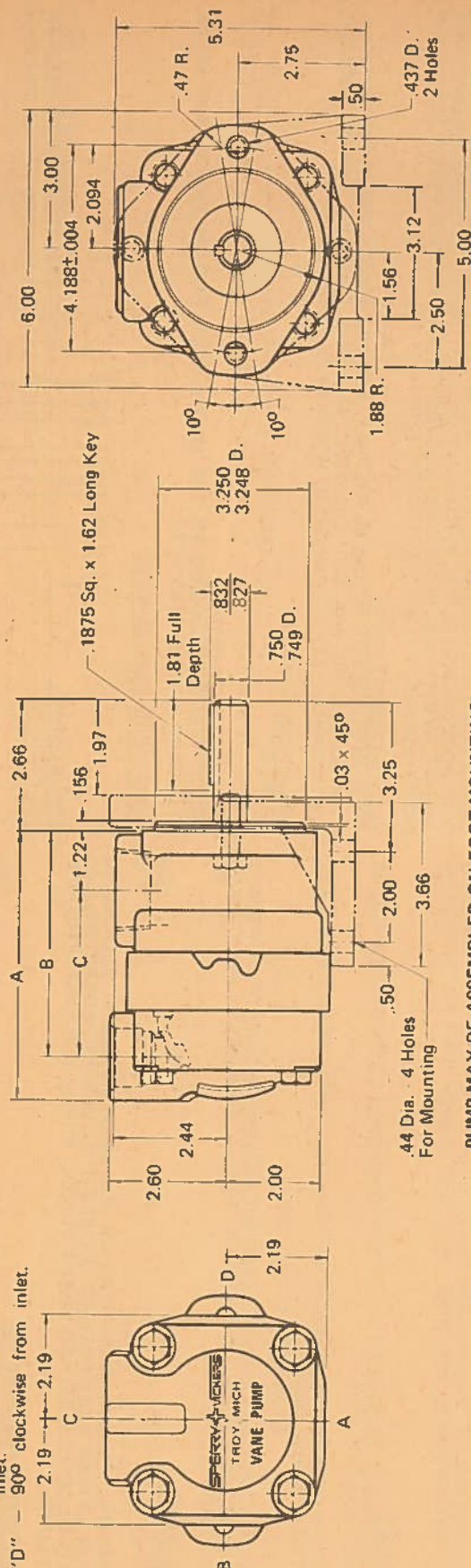
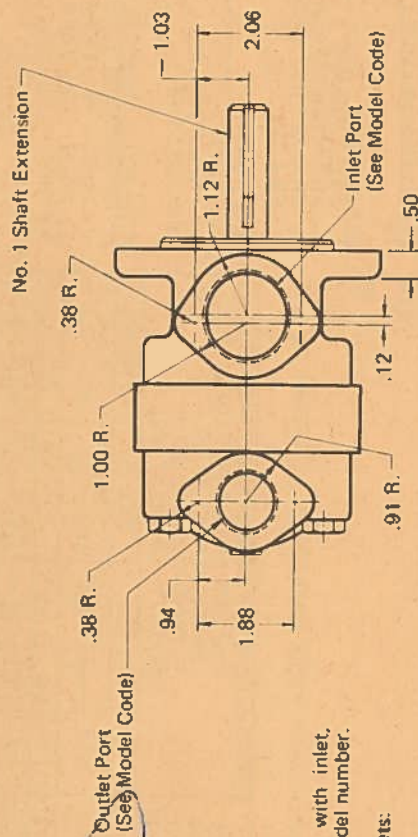
Outlet assembled in line with inlet,  
is designated by "C" in model number.

**Optional locations of outlets:**

(Viewed from cover end):  
'A' - Opposite inlet

“B” — 90° counterclockwise from

inlet.



**PUMP MAY BE ASSEMBLED ON FOOT MOUNTING  
IN ANY ONE OF FOUR POSITIONS.**

REVISÉ 10 3 77

502200



## General Data

Series V20 pumps are of Sperry Vickers "balanced vane type" construction.

## Filtration

For maximum over all efficiency and service life, filtration of 25 micron or less is recommended. For fire resistant fluids this filtration is mandatory.

## Shaft Rotation

Pumps are normally assembled for right hand or clockwise rotation as viewed from the shaft end.

If left hand or counterclockwise rotation is required, specify by adding suffix "L" to the model number.

Example: V20-1P13R-1X10-L

Inlet and outlet ports remain the same regardless of direction of shaft rotation. Change of assembly of internal parts is necessary when change of shaft rotation is required.

## Input Drive Speed

Minimum recommended drive speed..... 600 RPM  
Maximum recommended ratings are tabulated in chart below for three types of fluid. These are influenced by specific gravity, viscosity and suction head. Pump suction and speed should be related so that vacuum at pump inlet does not exceed 5" of mercury for petroleum oil and water glycol, and 3" for synthetic fire resistant fluids and water-in-oil emulsions. Maximum inlet pressure 5 psi all fluids.

## Maximum Recommended Operating Pressure

(See tabulation below.)

## Fluids

Petroleum Oils - Use antiwear type hydraulic oils or SAE 10W oils meeting A.P.I. service classification "MS". Refer to data sheet I-286-S for hydraulic fluid and temperature recommendations. Viscosity of oil at 100° F. should be 150-225 SUS. Maximum oil temperature of 150° F. is recommended.

Water Containing Fluids - Water glycols and water-in-oil emulsions, as produced by responsible sources for ratings given herein, are recommended. Select fluids with a viscosity as close as possible to that of petroleum oil described above. It is recommended that temperatures for water base fluids be limited to a maximum of 130° F.

Synthetic Fire Resistant Fluids - Phosphate esters, chlorinated hydrocarbons, and blends as produced by responsible sources for ratings given herein are recommended. Select fluids with viscosity as close as possible to that for petroleum oil described above. Maximum specific gravity of 1.3 is suggested. The fluid must be compatible with pump seals of fluorocarbon elastomers (i.e., viton, etc.). To obtain pumps equipped for operation with synthetic fire resistant fluids, add the prefix "F3" to the model number. Example: F3-V20-1P13R-1C10.

See note on maximum speed.

## Electric Motor Pumps

Many motor manufacturers are prepared to furnish drip proof or totally enclosed motors with end bells on which this pump can be mounted.

Submit copy of installation drawing to motor manufacturer.

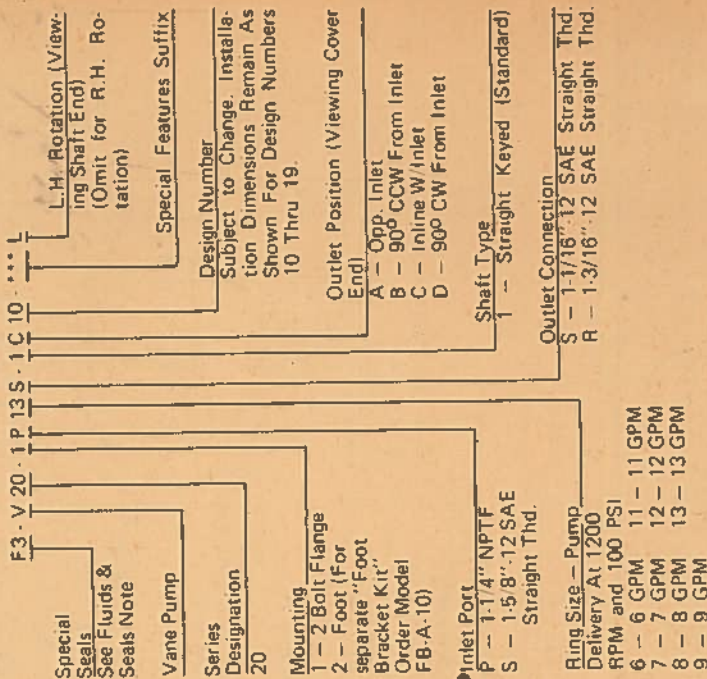
Weight Lbs. (Approx.)

Flange..... 11  
Foot..... 16

## Ordering Instructions

Select pumps according to the model code explanation shown below. Standard options are listed.

## Model Code Explanation:



Note: For volumes in excess of 12 GPM, 1 1/4" NPTF inlet port must be used

MODEL NUMBERS USE AS LISTED FOR PETROLEUM AND WATER CONTAINING FLUIDS. FOR SYNTHETIC FLUIDS, SEE SYN- THETIC FLUIDS PARAGRAPH ABOVE.		OPERATING CHARACTERISTICS AT 1200 RPM. DATA BASED ON PERFORMANCE AT OIL TEMPERATURE OF 120° F. VISCOSITY 150 SSU AT 100° F.								MAXIMUM SPEED (RPM) WHEN USED WITH FLUID TYPES		PRESSURE (PSI) CONTINUOUS DUTY				STANDARD GRAPHICAL SYMBOL FOR FLUID POWER DIAGRAMS	
		100 PSI		1000 PSI		2000 PSI											
		GPM	INPUT HP	GPM	INPUT HP	GPM	INPUT HP										
FLANGE	FOOT							PETROLEUM OIL, WATER-GLYCOL, AND WATER-IN-OIL EMULSION	SYNTHETIC FLUID	PETROLEUM OIL	SYNTHETIC	WATER GLYCOL	WATER-IN-OIL EMULSION				
V20-1P6*-1C10	V20-2P6*-1C10	6	1.25	5.6	4.2	5.2	8.4	1800	1800	2250	2000	1800	1575		502200-1		
V20-1P7*-1C10	V20-2P7*-1C10	7	1.25	6.5	5.0	6.2	9.2		1800	2250	2000	1800	1575				
V20-1P8*-1C10	V20-2P8*-1C10	8	1.25	7.6	5.6	7.2	10.9		1800	2250	2000	1800	1575				
V20-1P9*-1C10	V20-2P9*-1C10	9	1.30	8.6	6.2	8.2	12.1		1800	2250	2000	1800	1575				
V20-1P11*-1C10	V20-2P11*-1C10	11	1.30	11.0	7.6	10.5	14.6		1500	2250	2000	1575	1350				
V20-1P12*-1C10	V20-2P12*-1C10	12	1.30	11.4	8.2	10.8	15.6		1500	2000	1800	1575	1350				
V20-1P13*-1C10	V20-2P13*-1C10	13	1.30	13.0	8.8	12.5	16.7	1500	1500	2000	1800	1575	1350				



**SERIES V2020**

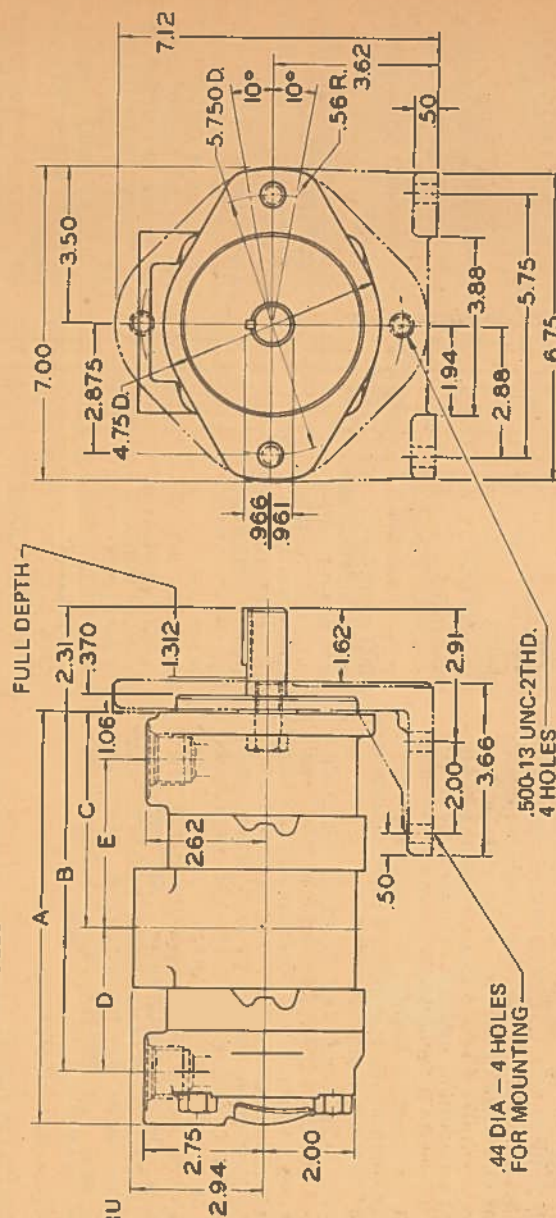
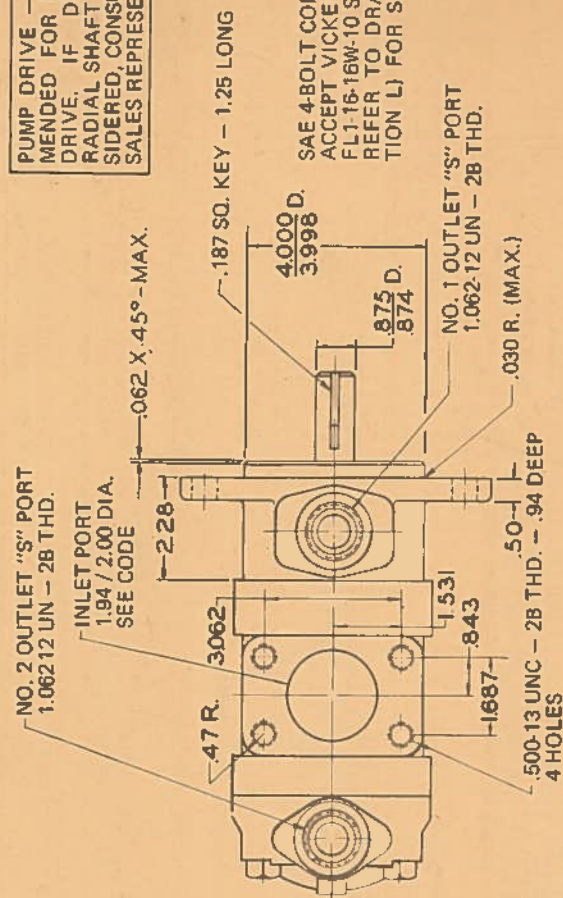
**FIXED DISPLACEMENT - VANE TYPE  
FOR USE WITH OIL OR FIRE RESISTANT FLUIDS  
2-BOLT FLANGE OR FOOT MOUNTING**

AT TIME OF FIRST STARTING, IF THE PUMP DOES NOT IMMEDIATELY PRIME, AIR SHOULD BE BLED FROM PUMP DELIVERY LINE. THIS MAY BE ACCOMPLISHED BY LOOSENING A CONNECTION IN THE DELIVERY LINE CLOSE TO THE PUMP UNTIL OIL FLOWS, INDICATING PUMP HAS PRIMED. AN AIRBLEED VALVE IS AVAILABLE FOR THIS PURPOSE. SEE DRAWING 521601.

**PUMP DRIVE - PUMP - RECOMMENDED FOR DIRECT AXIAL DRIVE. IF DRIVES IMPOSING RADIAL SHAFT LOADS ARE CONSIDERED, CONSULT THE VICKERS SALES REPRESENTATIVE.**

RATED DELIVERY GPM @ 1200 RPM & 100 PSI	DIMENSION						
	SHAFT END	COVER END	A	B	C	D	E
7, 8 or 9	6		8.41	7.39	4.49	2.90	3.43
7, 8 or 9	7, 8 or 9		8.66	7.64	4.49	3.15	3.43
11	6		8.61	7.59	4.69	2.90	3.63
11	7, 8 or 9		8.86	7.84	4.89	3.15	3.63
11	11		9.05	8.03	4.69	3.35	3.63
12 or 13	6		8.75	7.73	4.82	2.90	3.76
12 or 13	7, 8 or 9		8.99	7.97	4.82	3.15	3.76
12 or 13	11		9.19	8.17	4.82	3.35	3.76

DWG. NO.  
503500



NOTE:  
PUMP MAY BE ASSEMBLED ON FOOT MOUNTING IN ANY ONE OF FOUR POSITIONS.

RELEASED 10-1-71

503500



CONSTRUCTION  
SERIES V2020 PUMPS ARE OF VICKERS "BALANCED  
VANE TYPE" CONSTRUCTION.

FILTRATION  
FOR MAXIMUM OVER-ALL EFFICIENCY AND SERVICE  
LIFE, FILTRATION OF 25 MICRON OR LESS IS RECOM-  
MENDED. FOR FIRE RESISTANT FLUIDS THIS FILTRA-  
TION IS MANDATORY.

SHAFT ROTATION  
PUMPS ARE NORMALLY ASSEMBLED FOR RIGHT  
HAND OR COUNTERCLOCKWISE ROTATION AS VIEWED FROM  
THE SHAFT END.

IF LEFT HAND OR COUNTERCLOCKWISE ROTATION  
IS REQUIRED, SPECIFY BY ADDING SUFFIX "L" TO  
THE MODEL NUMBER.

EXAMPLE: V-2020-1F13S11S-1CC-20-L  
INLET AND OUTLET PORTS REMAIN THE SAME RE-  
GARDLESS OF DIRECTION OF SHAFT ROTATION.  
CHANGE OF ASSEMBLY OF INTERNAL PARTS IS NEC-  
ESSARY WHEN CHANGE OF SHAFT ROTATION IS  
REQUIRED.

INPUT DRIVE SPEED  
MINIMUM RECOMMENDED DRIVESPEED, .... 600 RPM  
MAXIMUM SPEED RATINGS ARE TABULATED IN  
CHART BELOW FOR THREE TYPES OF FLUID. THESE  
ARE INFLUENCED BY SPECIFIC GRAVITY, VISCOSITY  
AND SUCTION HEAD. PUMP SUCTION AND SPEED  
SHOULD BE RELATED SO THAT VACUUM AT PUMP  
INLET DOES NOT EXCEED 5" OF MERCURY FOR  
PETROLEUM OIL AND WATER GLYCOL, AND 3" FOR  
SYNTHETIC FIRE RESISTANT FLUIDS AND WATER-IN-  
OIL EMULSIONS. MAXIMUM INLET PRESSURE 5 PSI  
ALL FLUIDS.

FLUIDS  
PETROLEUM OILS - USE ANTIWEAR TYPE HYDRAULIC  
OILS OR SAE 10W OILS MEETING A.P.I. SERVICE  
CLASSIFICATION "MS". (SEE "OIL RECOMMENDATION  
SHEET 286-S" FOR DETAILS.) VISCOSITY OF OIL AT

100° F. SHOULD BE 150-225 SUS. MAXIMUM OIL  
TEMPERATURE OF 150° F. IS RECOMMENDED.

WATER CONTAINING FLUIDS - WATER GLYCOLS AND  
WATER-IN-OIL EMULSIONS, AS PRODUCED BY RE-  
SPONSIBLE SOURCES FOR RATINGS GIVEN HEREIN,  
ARE RECOMMENDED. SELECT FLUIDS WITH A VISCOSITY  
AS CLOSE AS POSSIBLE TO THAT OF PETRO-  
LEUM OIL DESCRIBED ABOVE. IT IS RECOMMENDED  
THAT TEMPERATURES FOR WATER BASE FLUIDS BE  
LIMITED TO A MAXIMUM OF 130° F.

SYNTHETIC FIRE RESISTANT FLUIDS - PHOSPHATE  
ESTERS, CHLORINATED HYDROCARBONS, AND  
BLENDS AS PRODUCED BY RESPONSIBLE SOURCES  
FOR RATINGS GIVEN HEREIN ARE RECOMMENDED.  
SELECT FLUIDS WITH VISCOSITY AS CLOSE AS POSSI-  
BLE TO THAT FOR PETROLEUM OIL DESCRIBED  
ABOVE. MAXIMUM SPECIFIC GRAVITY OF 1.3 IS SUG-  
GESTED. THE FLUID MUST BE COMPATIBLE WITH  
PUMP SEALS OF FLUOROCARBON ELASTOMERS (i.e.,  
VITON, ETC.). TO OBTAIN PUMPS EQUIPPED FOR  
OPERATION WITH SYNTHETIC FIRE RESISTANT  
FLUIDS, ADD THE PREFIX "F3" TO THE MODEL  
NUMBER. EXAMPLE: F3-V2020-1F13S11S-1CC-20  
SEE NOTE ON MAXIMUM SPEED.

ELECTRIC MOTOR PUMPS  
MANY MOTOR MANUFACTURERS ARE PREPARED TO  
FURNISH DRIP PROOF OR TOTALLY ENCLOSED MO-  
TORS WITH END BELLS ON WHICH THIS PUMP CAN BE  
MOUNTED. SEE VICKERS DRAWING 1-258202 FOR  
DESCRIPTION.

WEIGHT LBS. (APPROX.)  
FLANGE MTG. .... 35  
FOOT MTG. .... 40

ORDERING INSTRUCTIONS  
SELECT PUMPS ACCORDING TO THE TYPICAL MODEL  
CODE SHOWN. AVAILABLE STANDARD OPTIONS ARE  
LISTED IN THIS CODE.

RING SIZES	TYPICAL OPERATING CHARACTER- ISTICS AT 1200 RPM.				MAXIMUM SPEED (RPM) WHEN USED WITH FLUID TYPES				PRESSURE (PSI) CONTINUOUS DUTY			
	DATA BASED ON PERFORMANCE AT OIL TEMPERATURE OF 120° F. VISCOSITY 150 SSU AT 100° F.				PETROLEUM OIL, WATER-GLYCOL AND WATER-IN-OIL EMULSION				SYNTHETIC FLUID OIL GLYCOL EMULSION			
	100 PSI GPM	1000 PSI GPM	2000 PSI GPM	2000 PSI HP	100 PSI GPM	1000 PSI GPM	2000 PSI GPM	2000 PSI HP	100 PSI GPM	1000 PSI GPM	2000 PSI GPM	2000 PSI HP
6	6.0	1.25	5.6	4.2	5.2	8.4	8.4	8.4	1800	2250	2000	1575
7	7.0	1.25	6.5	5.0	6.2	9.2	9.2	9.2	1800	2250	2000	1575
8	8.2	1.25	7.6	5.6	7.2	10.9	10.9	10.9	1800	2250	2000	1575
9	9.2	1.30	8.5	6.2	8.2	12.1	12.1	12.1	1800	2250	2000	1575
11	11.5	1.30	11.0	7.6	10.5	14.6	14.6	14.6	1500	2250	2000	1350
12	12.0	1.30	11.4	8.2	10.8	15.6	15.6	15.6	1500	2000	1800	1575
13	13.5	1.30	13.0	8.8	12.5	16.7	16.7	16.7	1500	2000	1800	1575

SEE CHART ON FRONT PAGE FOR SHAFT AND COVER END COMBINATIONS, NUMBER 6 RING NOT USED IN SHAFT END,  
NUMBER 12 AND 13 NOT USED IN COVER END.

V 2020-23 F13S11S-1CC-20-L

VANE  
PUMP

SERIES  
DESIGNATION

MOUNTING  
1-2BOLT FLANGE  
2-FOOT BRACKET

FOOT BRACKET  
MOUNTING POSITION

WITH RESPECT TO  
INLET PORT WHEN  
VIEWED FROM

SHAFT END NO CODE  
NUMBER REQUIRED  
FOR INLET PORT AT

12 O'CLOCK  
3= INLET PORT AT  
3 O'CLOCK

6= INLET PORT AT  
6 O'CLOCK  
9= INLET PORT AT  
9 O'CLOCK

INLET PORT  
F-4BOLT FLANGE  
2.00 DIA.

GPM - SHAFT END  
7-7 9-9 12-12  
8-8 11-11 13-13

NO. 1 OUTLET PORT  
(SHAFT END)  
S-1.062-12 UN-28 STR. THD.

GPM - COVER END  
6-6 8-8 11-11  
7-7 9-9

NO. 2 OUTLET PORT  
(COVER END)  
S-1.062-12 UN-2B STR. THD.

SHAFT TYPE  
1 - STRAIGHT KEYED

SHAFT ROTATION  
L - LEFT HAND

DESIGN NUMBER  
SUBJECT TO CHANGE.  
INSTALLATION DIMEN-  
SIONS REMAIN AS  
SHOWN FOR DESIGN  
NUMBERS 20 THRU 29.

OUTLET POSITIONS (FAC-  
ING COVER END)  
OUTLET NO. 1 OPPOSITE  
INLET

AA = NO. 2 OUTLET  
OPPOSITE INLET

AB = NO. 2 OUTLET 90°  
CCW FROM INLET

AC = NO. 2 OUTLET  
INLINE WITH INLET

AD = NO. 2 OUTLET 90°  
CW FROM INLET

OUTLET NO. 1 90° CCW  
FROM INLET

BA = NO. 2 OUTLET  
OPPOSITE INLET

BB = NO. 2 OUTLET 90°  
CCW FROM INLET

BC = NO. 2 OUTLET  
INLINE WITH INLET

BD = NO. 2 OUTLET 90°  
CW FROM INLET

OUTLET NO. 1 INLINE WITH  
INLET

CA = NO. 2 OUTLET  
OPPOSITE INLET

CB = NO. 2 OUTLET 90°  
CCW FROM INLET

CC = NO. 2 OUTLET  
INLINE WITH INLET

CD = NO. 2 OUTLET 90°  
CW FROM INLET

OUTLET NO. 1 90° CW  
FROM INLET

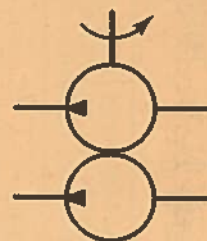
DA = NO. 2 OUTLET  
OPPOSITE INLET

DB = NO. 2 OUTLET 90°  
CCW FROM INLET

DC = NO. 2 OUTLET  
INLINE WITH INLET

DD = NO. 2 OUTLET 90°  
CW FROM INLET

STANDARD GRAPHICAL SYMBOL  
FOR FLUID POWER DIAGRAMS





yr  
Buck

SPERRY-VICKERS<sup>TM</sup>

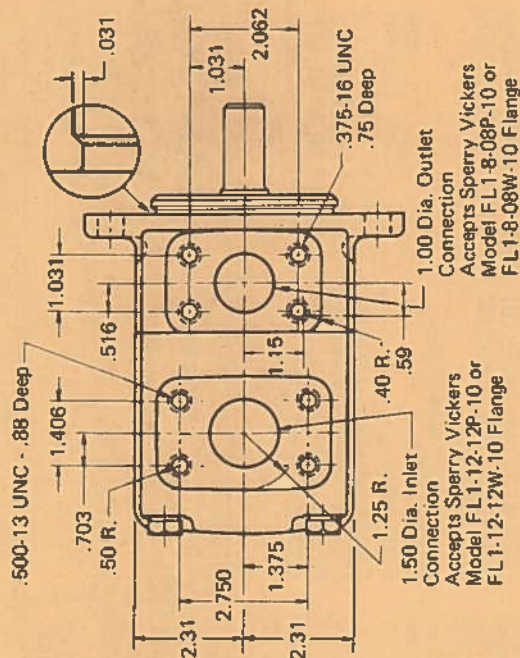
## HIGH PERFORMANCE SINGLE PUMPS

**SERIES 25V\*.18" FIXED DISPLACEMENT - VANE TYPE  
FOR USE WITH OIL, OR SYNTHETIC, WATER GLYCOL  
AND WATER-IN-OIL EMULSION FIRE RESISTANT FLUIDS**

## General Data

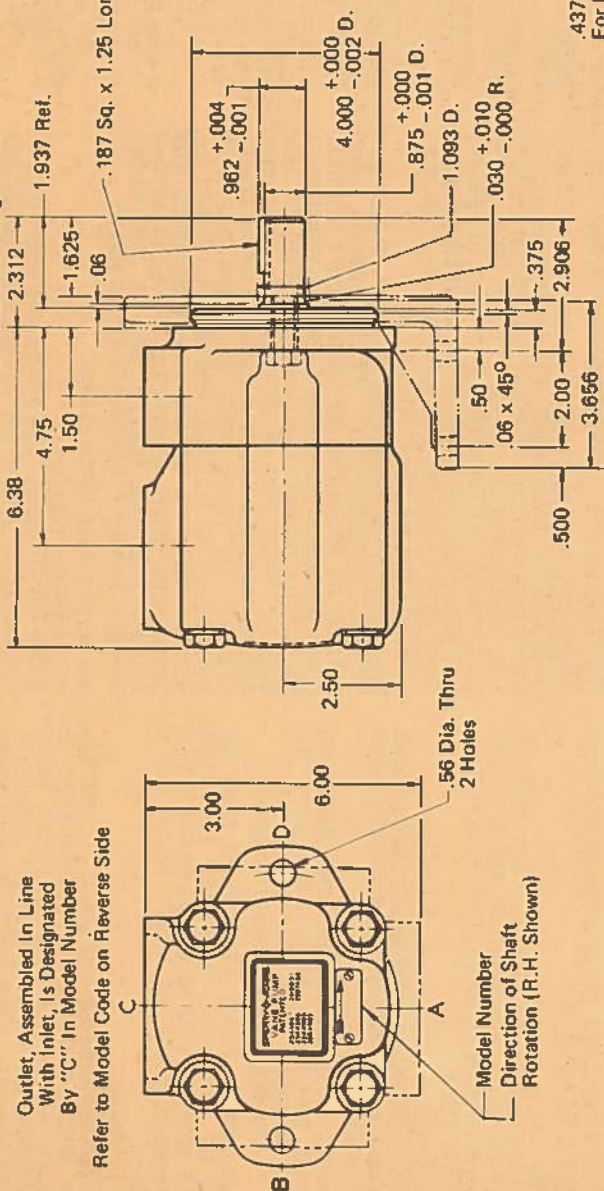
**Series 25V pumps are of Sperry Vickers "balanced vane type" construction.**

Maximum Speed (RPM) When Used With Fluid Types		Maximum Pressures (PSI) When Used With Fluid Types			
Petro- leum Oil	Synthetic Water Glycol & Water- in-oil Emulsion	Petro- leum Oil	Synthetic	Water Glycol	Water-in-oil Emulsion
1800	1200	2500	2000	2000	1000



SAE 4-Bolt Connection Pads For Use  
With SAE 4-Bolt Flanges, See Drawing  
1.250700 For Selection.

4-Bolt SAE Flange Connections Will Also Accommodate User's 2-Bolt Flanges Of The Proper Design.



MODEL 25V\*\*A-1C10-18\*  
(STANDARD 2-BOLT FLANGE OR FOOT MOUNTING)

REVISÉ 11-1-78

502500

**SPERRY VICKERS**  
TROY, MICHIGAN 48064

**PUMPS  
SINGLE**

## FIXED DISPLACEMENT

**VANE TYPE  
SERIES 25V**

**NOMINAL  
12 TO 21 GPM**

**2-BOLT FLANGE  
OR FOOT MOUNTING**

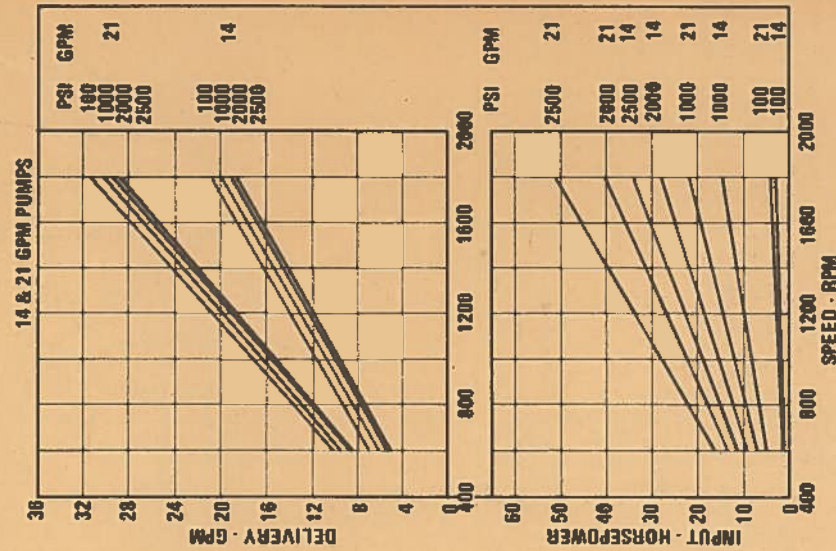
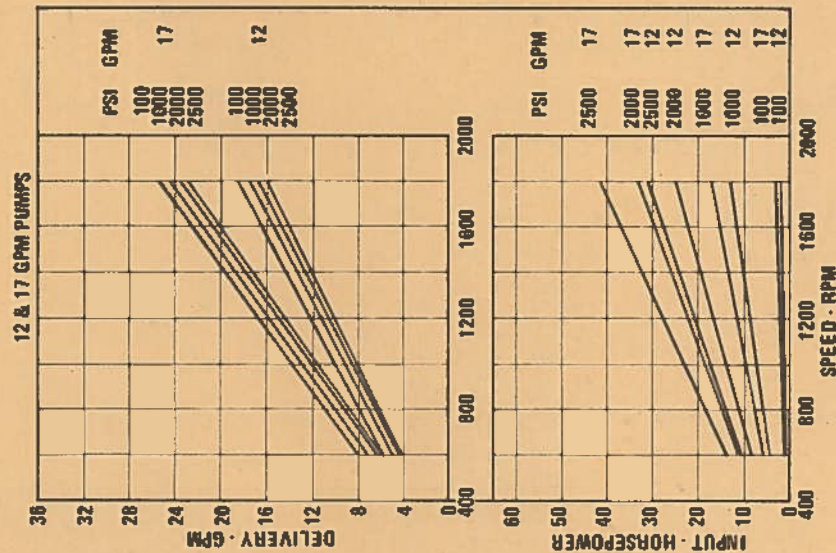
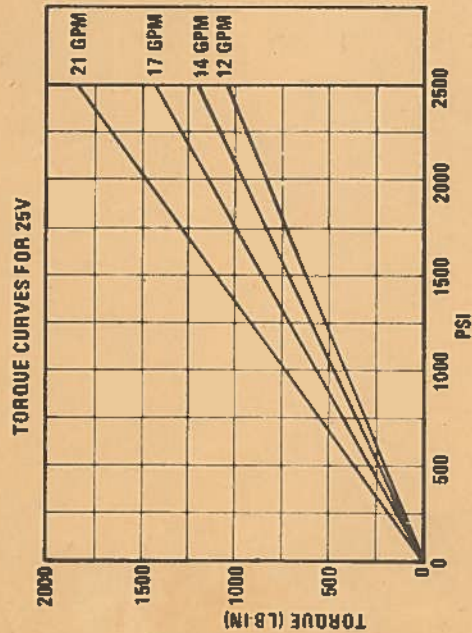
DWG. NO.  
502500



STANDARD GRAPHICAL  
SYMBOL FOR FLUID  
POWER DIAGRAM



TYPICAL PERFORMANCE CURVES (25V)  
DATA BASED ON OPERATION WITH  
SAE 10W ANTI-WEAR OIL AT 120°F.





## General Data

Series 25V pumps are of Sperry Vickers "balanced vane type" construction.

## Filtration (Mandatory)

25 Microns or Less

## Drive Data

### Shaft Rotation

Pumps are normally assembled for right hand or clockwise rotation as viewed from the shaft end.

If left hand or counterclockwise rotation is required, specify by adding the symbol "L" to the model number.

Example: 25V21A-1C10L-180

Inlet and outlet ports remain the same regardless of direction of shaft rotation. Change of assembly of internal parts if necessary when change of shaft rotation is required.

## Pump Drive

Pump is recommended for direct coaxial drive. If drives imposing radial shaft loads are considered, consult your Sperry Vickers sales representative.

Minimum Recommended Drive Speed, ..... 600 RPM

Maximum Speed Ratings and Inlet Vacuum are tabulated for four types of fluid. These are influenced by specific gravity, viscosity and suction head. Pump suction and speed should be related so that vacuum at pump inlet does not exceed 5" of mercury for petroleum oil and water glycol; 3" for synthetic and water-in-oil emulsion fluids.

## Ratings

### Maximum Speed (RPM)

Petroleum Oil.....	1800
Synthetic, Water Glycol and Water-in-oil Emulsion.....	1200
Maximum Pressure (PSI)	
Petroleum Oil.....	2500
Synthetic.....	2000
Water Glycol.....	2000
Water-in-oil Emulsion.....	1000

## Special Information

Note: Do not run a pump with the outlet pressure lower than the inlet pressure. This causes operating noise and vane instability.

## Air Bleed

At time of first starting, if the pump does not immediately prime, air should be bled from pump delivery line. This may be accomplished by loosening a connection in the delivery line close to the pump until oil flows, indicating pump has primed. An airbleed valve is available for this purpose. See drawing 521601.

## Caution:

There is no case drain connection. The pump is drained internally into its inlet. System pressure at the pump inlet connection may not exceed 20 psi.

## Fluids and Temperature Data

Petroleum Oils - Use antiwear industrial hydraulic oils or automotive crankcase oils having letter designations SC, SD or SE.

Running viscosity range 70 to 250 SUS. Operating temperature 120°F. recommended, 150°F usual maximum.

For details, refer to hydraulic fluid and temperature recommendations for industrial machinery, data sheet I-286-S in catalogue.

Water Glycols - Select fluids with an operating viscosity of the petroleum oil described above. Recommended maximum temperature 130°F.

Water-in-oil Emulsion may be used however, they require careful selection and monitoring of the fluid. For assistance contact Sperry Vickers representative. Soluble-oil-in-water solutions not recommended.

Synthetic Fire Resistant Fluids - Phosphate esters and their blends with operating viscosity of the petroleum oil described above. These fluids are generally compatible with fluorocarbon and silicone elastomers. Add F3 prefix to the model number.

## Sound Data (With 21 GPM Ring)

Sound level is 67 db(A) at 1200 RPM and 2000 PSI using SAE 10W oil at 120°F. 5" Hg inlet. Tested per ISO-draft international standard 4412.

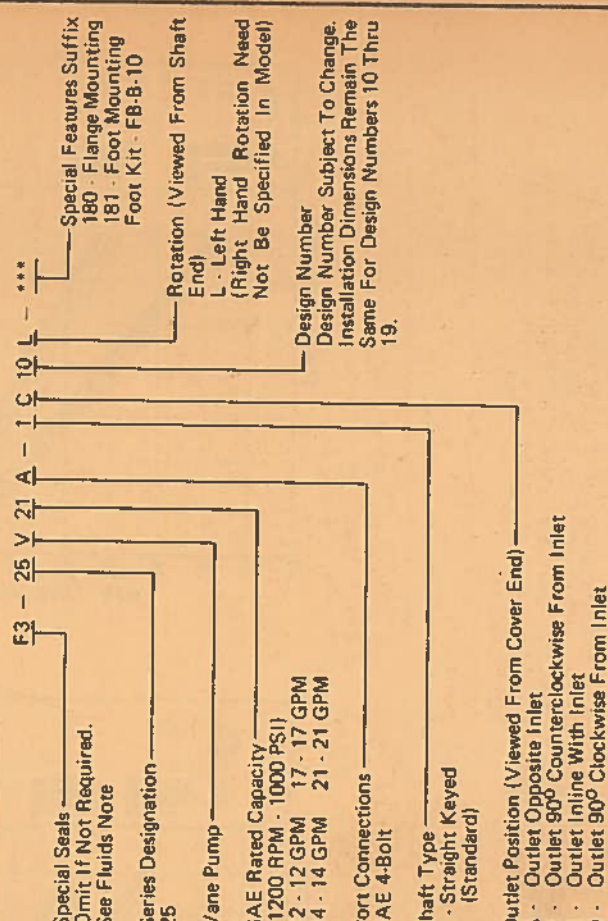
## Electric Motor Pumps

Many motor manufacturers are prepared to furnish drip proof or totally enclosed motors with end bells on which this pump can be mounted.

## Weight Lbs. (Approx.)

25V\*\*\*10-180 (Std. 2-Bolt Mounting)..... 32  
25V\*\*\*10-181 (Foot Mounting)..... 38

## Typical Model Code









# VICKERS HYDRAULIC POWER PACK

WITH ADJUSTABLE RELIEF VALVE  
1/4 PIPE THREAD CONNECTIONS

MODEL NUMBERS	MAXIMUM DRIVE SPEED R.P.M.	DELIVERY G.P.M. AT 1200 R.P.M.	WEIGHT LESS OIL APPROX.
PK6-1000-D	2500	1.5	1.3
PK6-2000-D	2500	2.4	2.2
		2.0	1.7
		1.7	1.3

POWER INPUT AT MAX. OVERLOAD CONDITION, 1000 P.S.I. WORKING PRESSURE & 1200 R.P.M.	
PK6-1000-D	1.7 H.P.
PK6-2000-D	2.3 H.P.

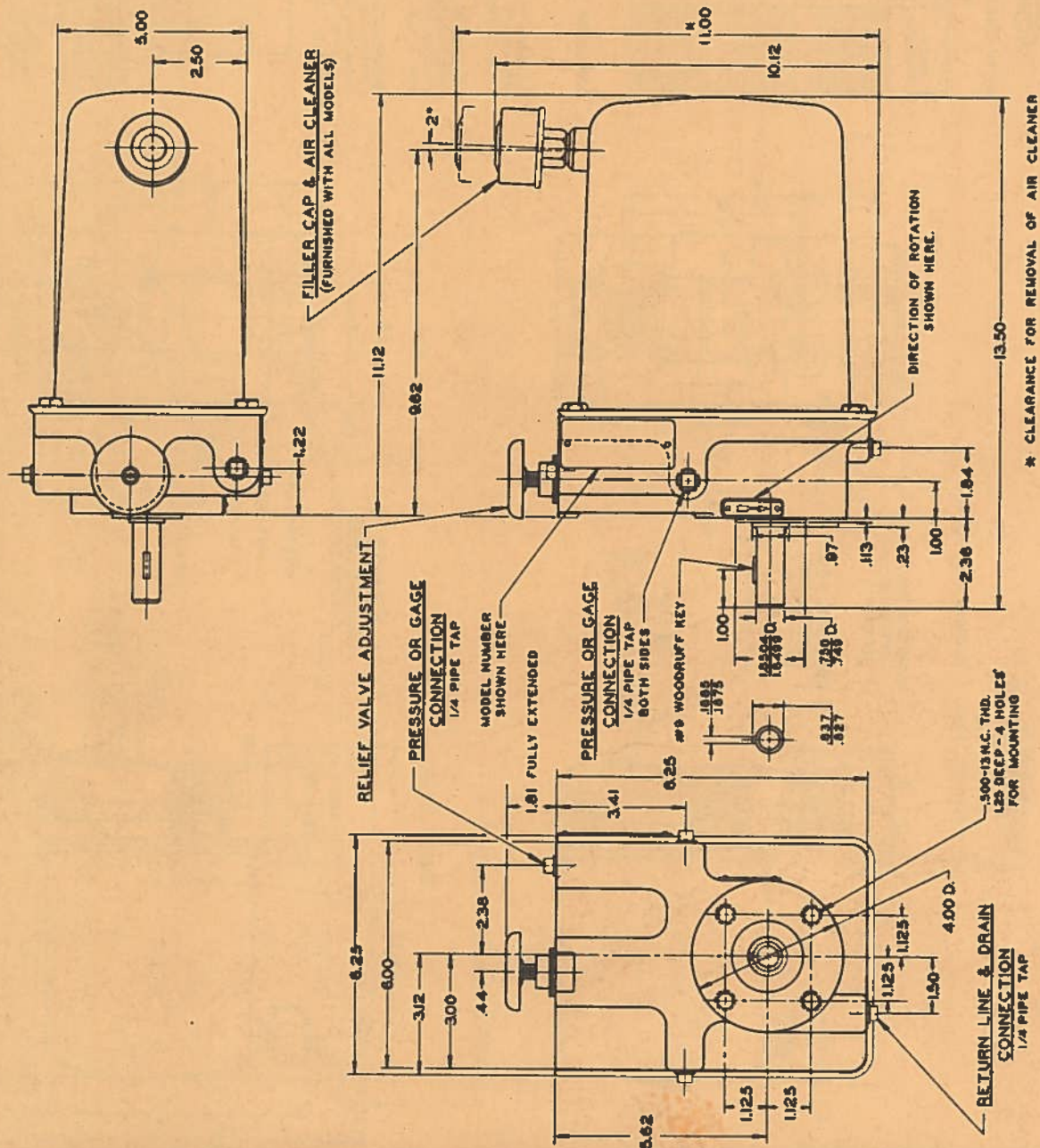
## DRIVE DATA

H.P. INPUT AT OTHER DRIVING SPEEDS AND WORKING PRESSURE IS APPROXIMATELY PROPORTIONAL TO R.P.M. AND PRESSURE. DELIVERY AT OTHER DRIVING SPEEDS IS APPROXIMATELY PROPORTIONAL TO THE R.P.M.

DIRECTION OF DRIVE SHAFT ROTATION OF MODELS TABULATED IS RIGHT HAND VIEWING DRIVE SHAFT END. LEFT HAND ROTATION MUST BE SPECIFIED BY ADDING SUFFIX "L.H." TO MODEL NUMBER. EXAMPLE: PK6-1000-D-L.H.

RELIEF VALVE ADJUSTMENT-----75 TO 1000 P.S.I.

TANK CAPACITY: SERIES PK6-ONE GALLON \* (APPROXIMATELY 3 PINTS USABLE)



REVISED 1-3-72

VICKERS DIVISION  
OF SPERRY RAND CORPORATION  
TROY, MICHIGAN 48064

POWER PACK  
INTEGRAL DESIGN

SERIES  
PK6

VANE  
PUMP

1 & 2  
GPM

FACE  
MOUNTING

DWG. NO.  
500200



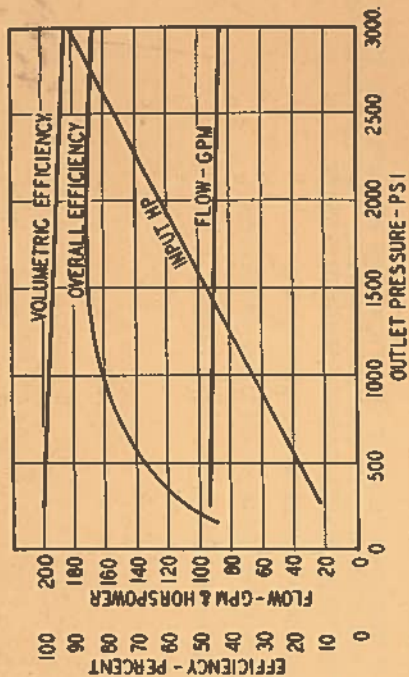
**MODEL CODE**

P	V	B	90	-	(F)	*	D	F	-	21	-	D	(A)	-	11
<p>CONTROL DESIGN NUMBERS SUBJECT TO CHANGE. INSTALLATION DIMENSIONS REMAIN AS SHOWN FOR DESIGN NUMBERS 10 THROUGH 19.</p>															
<p>OPTIONS A - CONTROL PUMP (OMIT WHEN NOT INCLUDED) CONTROL STEM SERVO CONTROL</p>															
<p>PUMP DESIGN NUMBER SUBJECT TO CHANGE. INSTALLATION DIMENSIONS REMAIN AS SHOWN FOR DESIGN NUMBERS 20 THROUGH 29.</p>															
<p>PORT CONNECTIONS F - SAE 4 BOLT FLANGES SWASH PLATE MOVEMENT D - BOTH SIDES OF CENTER ROTATION (VIEWING SHAFT END) R - RIGHT HAND L - LEFT HAND</p>															
<p>MOUNTING TYPE F - FOOT BRACKET OMIT FOR FLANGE OR INTEGRAL FOOT MTG.</p>															
<p>GPM RATING @ 1800 RPM</p>															
<p>INLINE PISTON UNIT SERIES</p>															
<p>VARIABLE DISPLACEMENT</p>															
<p>PUMP</p>															

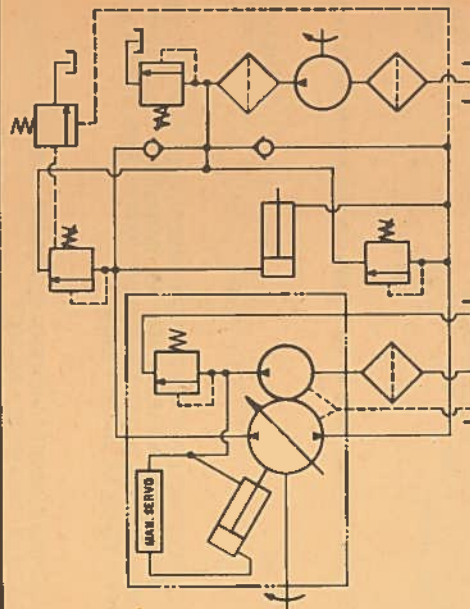
**TYPICAL PERFORMANCE CURVES**

PERFORMANCE CHARACTERISTICS WITHOUT AUXILIARY CONTROL PUMP  
(ADD 4 HP TO INPUT FOR CONTROL PUMP)  
BASED ON OIL TEMPERATURE OF 120° F. (115 SUS)

INPUT SPEED - 1800 RPM      INLET PRESSURE - 50 PSI



**TYPICAL  
CIRCUIT  
DIAGRAM**



WHEN USING A STEM SERVO CONTROLLED PUMP FOR REVERSING FLOW, THE PUMP INLET MUST BE KEPT SUPERCHARGED TO ABOUT 50-75 PSI. THE SYSTEM ILLUSTRATED SHOWS AN UNBALANCED CYLINDER WHEREIN THE EXTERNAL SUPERCHARGE PUMP CAPACITY IS SUFFICIENT TO MAKE UP LEAKAGE IN THE MAIN CIRCUIT PLUS THE DIFFERENCE IN VOLUME BETWEEN THE HEAD AND ROD ENDS OF THE CYLINDER CIRCUIT. CONTROL IS ACCOMPLISHED BY THE MOVEMENT OF THE PUMP STEM. FOR HYDRAULIC MOTORS OR DOUBLE-ENDED CYLINDERS THE UNLOADING VALVE IS NOT REQUIRED AND THE SUPERCHARGE PUMP CAPACITY NEED ONLY BE SUFFICIENT TO MAKE UP LEAKAGE.

509022-2



## GENERAL DATA

THIS UNIT IS OF THE AXIAL PISTON, VARIABLE DISPLACEMENT, INLINE DESIGN RATED AT 90 GPM AT 1800 RPM AND 1500 PSI. DISPLACEMENT IS CONTROLLED BY A STEM SERVO CONTROL WHICH OPERATES BOTH SIDES OF CENTER PERMITTING BI-DIRECTIONAL FLOW CHARACTERISTICS. SHAFT ROTATION IS AS TABULATED AND IS NOT REVERSIBLE.

## STEM SERVO CONTROL

USE OF THE STEM SERVO CONTROL PROVIDES ACCURATE CONTROL OF FLOW AND EXTREMELY SMOOTH FLOW REVERSAL WHILE ELIMINATING THE NEED FOR EXTERNAL FLOW, DECELERATION, AND DIRECTIONAL VALVES. THIS CONTROL PROVIDES MECHANICAL OR MANUAL SELECTION OF PUMP DELIVERY FROM ZERO TO MAXIMUM. THE STEM MAY BE MOVED .98 OF AN INCH ON EACH SIDE OF CENTER POSITION TO PERMIT FULL REVERSAL OF FLOW. DELIVERY RATE CHANGES LINEARLY WITH STEM POSITION. TOTAL STEM TRAVEL IS LIMITED TO 1.97 INCHES BY INTERNAL STOPS.

MINIMUM RECOMMENDED STROKING TIME (COMPLETE RANGE). . . . . 35 SECONDS

IF AUXILIARY PUMP IS NOT USED, PROVIDE 12 GPM AT 1000 PSI PRESSURE CONTROL POWER SOURCE TO OBTAIN MINIMUM RECOMMENDED STROKING TIME.

## INSTALLATION INFORMATION

HORIZONTAL MOUNTING IS RECOMMENDED TO MAINTAIN NECESSARY CASE FLUID LEVEL. THE CASE DRAIN LINE MUST BE FULL SIZE UNRESTRICTED AND CONNECTED FROM THE UPPERMOST DRAIN PORT DIRECTLY TO THE RESERVOIR IN SUCH A MANNER THAT THE HOUSING REMAINS FILLED WITH FLUID. PIPING OF DRAIN LINE MUST PREVENT SIPHONING. PIPE DRAIN LINE SO THAT IT TERMINATES BELOW RESERVOIR FLUID LEVEL. NO OTHER LINES ARE TO BE CONNECTED TO THIS DRAIN LINE. CAUTION MUST BE EXERCISED TO NEVER EXCEED 5 PSI UNIT CASE PRESSURE.

## STARTING

BEFORE STARTING, FILL CASE WITH SYSTEM FLUID THRU UPPERMOST DRAIN PORT. HOUSING MUST BE KEPT FULL AT ALL TIMES TO PROVIDE INTERNAL LUBRICATION.

WHEN FIRST STARTING, IT MAY BE NECESSARY TO BLEED AIR FROM PUMP OUTLET LINE TO PERMIT PRIMING AND REDUCE NOISE. BLEED BY LOOSENING AN OUTLET CONNECTION UNTIL SOLID STREAM OF FLUID APPEARS. AN AIRBLEED VALVE IS AVAILABLE FOR THIS PURPOSE. SEE DRAWING 521601.

TO ASSIST INITIAL PRIMING, CONTROL SETTING MUST BE AT LEAST 40% OF MAXIMUM FLOW POSITION.

## OPERATING SPECIFICATIONS

THEORETICAL DISPLACEMENT (MAXIMUM STROKE). . . . . 12.04 CU. IN./REV.

DELIVERY (THEORETICAL)

AT 1800 RPM. . . . . 93.8 GPM

## OPERATING SPEED

RATED. . . . . 1800 RPM  
MAXIMUM. . . . . 1800 RPM

## OPERATING PRESSURE

RATED. . . . . 1500 PSI  
MAXIMUM. . . . . 3000 PSI

INLET PRESSURE (MINIMUM). . . . . 50 PSI

## INPUT HORSEPOWER (MAXIMUM SPEED AND PRESSURE)

WITHOUT AUXILIARY CONTROL PUMP. . . . . 182 HP  
WITH AUXILIARY CONTROL PUMP. . . . . 186 HP

## DRIVE ROTATION

SHAFT ROTATION IS NOT REVERSIBLE AND MUST BE SPECIFIED WHEN ORDERING.

## FILTRATION

PRESSURE OR RETURN LINE. . . . . 25 MICRONS  
INLET. . . . . 149 MICRONS

## FLUIDS

CLEAN PETROLEUM OIL, MEETING OR EXCEEDING LUBRICATING QUALITIES OF SAE 10W MEETING API SERVICE CLASSIFICATION MS (MAXIMUM SEVERITY) IS RECOMMENDED. VISCOSITY RANGE IS 150-225 SUS AT 100° F. FOR HYDRAULIC OIL REQUIREMENTS REFER TO DATA SHEET 1-286-S.

## FLANGES

BOTH INLET AND OUTLET PORTS ACCEPT VICKERS' FL1-20-20P-10 OR FL1-20-20W-10 SAE 4-BOLT FLANGES; DATA ON DRAWING 1-250700.

WEIGHT (APPROXIMATE). . . . . 228 LBS.

THIS UNIT IS DESIGNED TO MEET SPECIFICATIONS AS OUTLINED. TO INSURE MAXIMUM UNIT PERFORMANCE IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION, CONSULT YOUR VICKERS APPLICATION ENGINEER IF YOUR:

APPLICATION REQUIRES AN INDIRECT DRIVE

MOUNTING ATTITUDE IS OTHER THAN HORIZONTAL

NEEDS REQUIRE APPLICATION ASSISTANCE



## HIGH PERFORMANCE SINGLE PUMPS

**SERIES 35V.\*-18\* FIXED DISPLACEMENT — VANE TYPE  
FOR USE WITH OIL, OR SYNTHETIC, WATER GLYCOL  
AND WATER-IN-OIL EMULSION FIRE RESISTANT FLUIDS**

SAE 4-Bolt Connection Pads Are For Use  
With SAE 4-Bolt Flanges, See Drawing  
I-250700 For Selection.

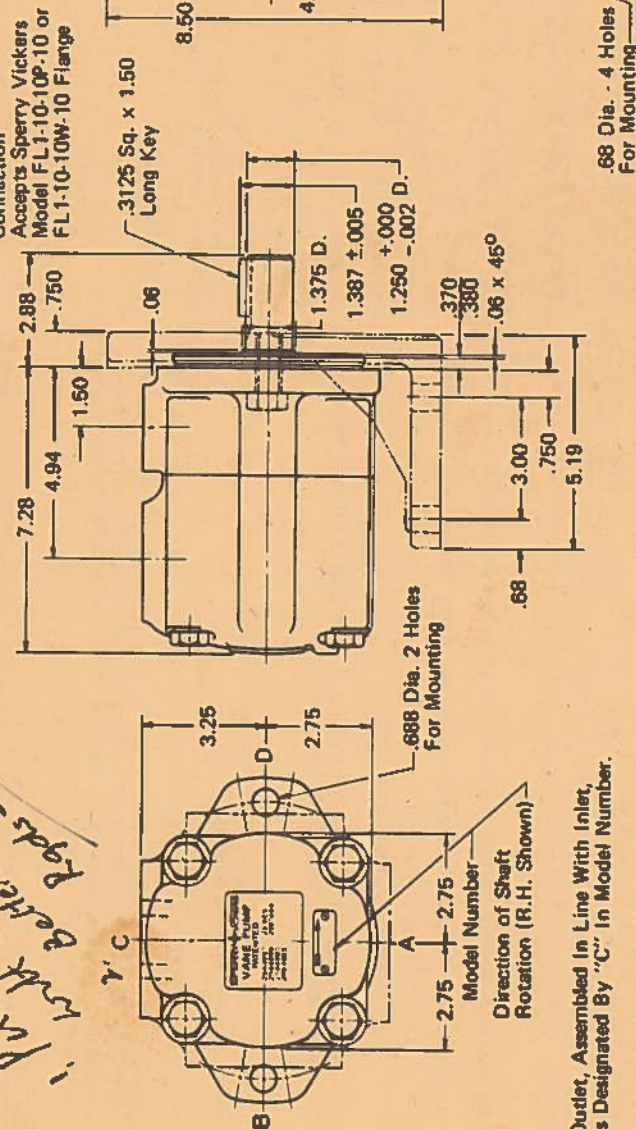
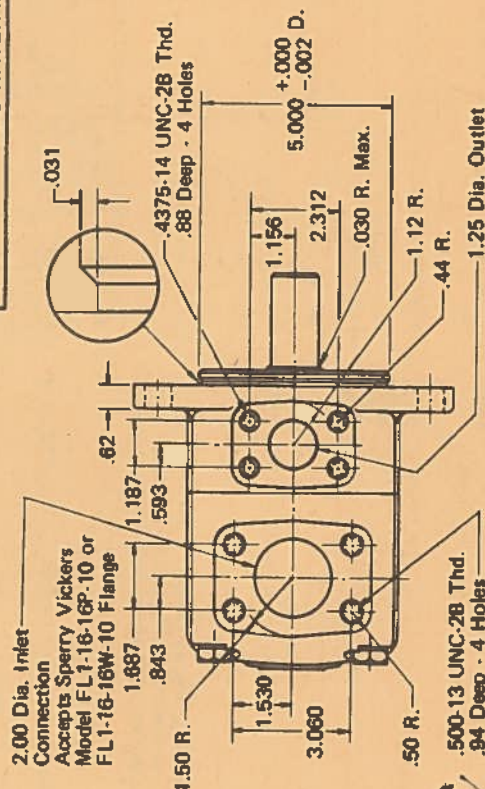
**4-Bolt SAE Flange Connections Will Also Accommodate User's 2-Bolt Flanges Of The Proper Design.**

### General Data

Series 35V pumps are of Sperry Vickers "balanced vane type" construction.

## Ratings (See Notes)

<u>Maximum Speed (RPM)</u>	
Petroleum Oil.....	1800
Fire Resistant Fluids.....	1200
<u>Maximum Pressure (PSI)</u>	
Petroleum Oil.....	2500
Synthetic and Water Glycol.....	2000
Water-in-oil Emulsion.....	1000



Outlet, Assembled In Line With Inlet,  
Is Designated By "C" In Model Number.

**Refer To Model Code On Reverse Side.**

**MODEL 35V\*\*A-1C10-18\***  
**(STANDARD 2-BOLT FLANGE OR FOOT MOUNTING)**

REVISÉ 11-1-78

502800



### General Data

Series 35V pumps are of Sperry Vickers "balanced vane type" construction.

Filtration (Mandatory). . . . . 25 Microns or Less

### Drive Data

#### Shaft Rotation

Pumps are normally assembled for right hand or clockwise rotation as viewed from the shaft end.

If left hand or counterclockwise rotation is required, specify by adding the symbol "L" to the model number.

Example: 35V38A-1C10L-180

Inlet and outlet ports remain the same regardless of direction of shaft rotation. Change of assembly of internal parts if necessary when change of shaft rotation is required.

### Pump Drive

Pump is recommended for direct coaxial drive. If drives imposing radial shaft loads are considered, consult your Sperry Vickers sales representative.

Minimum Recommended Drive Speed. . . . . 600 RPM

Maximum Speed Ratings and Inlet Vacuum are tabulated for four types of fluid. These are influenced by specific gravity, viscosity and suction head. Pump suction and speed should be related so that vacuum at pump inlet does not exceed 5" of mercury for petroleum oil and water glycol; 3" for synthetic and water-in-oil emulsion fluids.

### Ratings

Maximum Speed (RPM)	
Petroleum Oil. . . . .	1800
Synthetic, Water Glycol and Water-in-oil Emulsion. . . . .	1200
Maximum Pressure (PSI)	
Petroleum Oil. . . . .	2500
Synthetic. . . . .	2000
Water Glycol. . . . .	2000
Water-in-oil Emulsion. . . . .	1000

### Special Information

Note: Do not run a pump with the outlet pressure lower than the inlet pressure. This causes operating noise and vane instability.

### Air Bleed

At time of first starting, if the pump does not immediately prime, air should be bled from pump delivery line. This may be accomplished by loosening a connection in the delivery line close to the pump until oil flows, indicating pump has primed. An airbleed valve is available for this purpose. See drawing 521601.

### Caution:

There is no case drain connection. The pump is drained internally into its inlet. System pressure at the pump inlet connection may not exceed 20 PSI.

### Fluids and Temperature Data

Petroleum Oils - Use antiwear industrial hydraulic oils or automotive crankcase oils having letter designations SC, SD or SE.

Running viscosity range 70 to 250 SUS. Operating temperature 120°F. recommended, 150°F. usual maximum.

For details, refer to hydraulic fluid and temperature recommendations for industrial machinery, data sheet I-286-S in catalogue.

Water Glycols - Select fluids with an operating viscosity of the petroleum oil described above. Recommended maximum temperature 130°F.

Water-in-oil Emulsion may be used however, they require careful selection and monitoring of the fluid. For assistance contact Sperry Vickers representative. Soluble-oil-in-water solutions not recommended.

Synthetic Fire Resistant Fluids - Phosphate esters and their blends with operating viscosity of the petroleum oil described above. These fluids are generally compatible with fluorocarbon and silicone elastomers. Add F3 prefix to the model number.

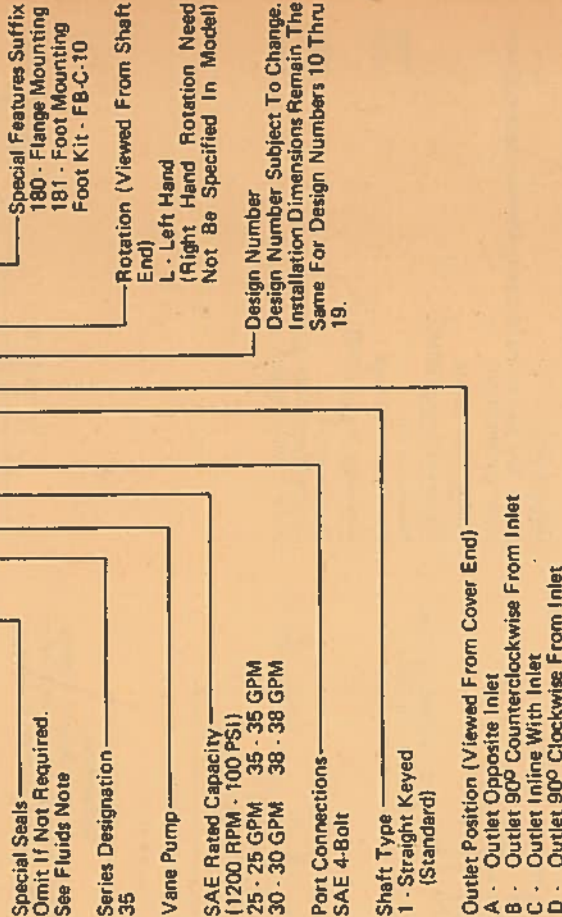
### Sound Data (With 38 GPM Ring)

Sound level is 71 db(A) at 1200 RPM and 2000 PSI using SAE 10W oil at 120°F. 5" Hg inlet. Tested per ISO-draft international standard 4412.

### Electric Motor Pumps

Many motor manufacturers are prepared to furnish drip proof or totally enclosed motors with end bells on which this pump can be mounted.

### Typical Model Code



### Weight Lbs. (Approx.)

35V***-10-180 (Std. 2-Bolt Mounting). . . . .	50
35V***-10-181 (Foot Mounting). . . . .	63



## General Data

Series 45V pumps are of Sperry Vickers "balanced vane type" construction.

SAE 4 Bolt Connection Pads Are For Use With SAE 4 Bolt Flanges, See Drawing 1-250700 For Selection.

4-Bolt SAE Flange Connections Will Also Accommodate User's 2-Bolt Flanges Of The Proper Design.

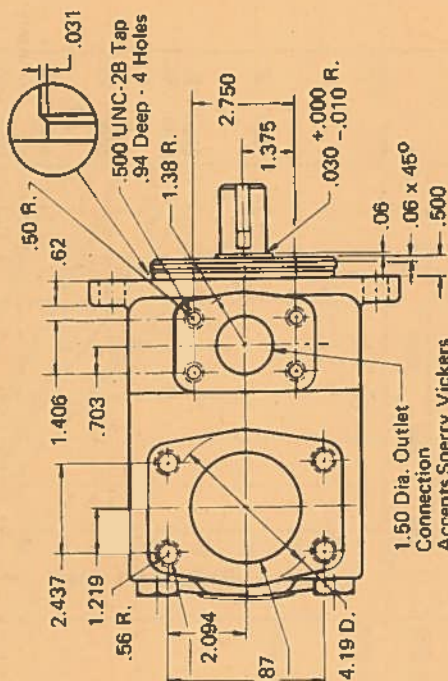
.625-11 UNC-2B Thd.  
.88 Useable Thd.  
Engagement - 4 Holes

3.00 Dia. Inlet Connection  
Accepts Sperry Vickers  
Model FL1-24-24P-10 or  
FL1-24-24W-10 Flange

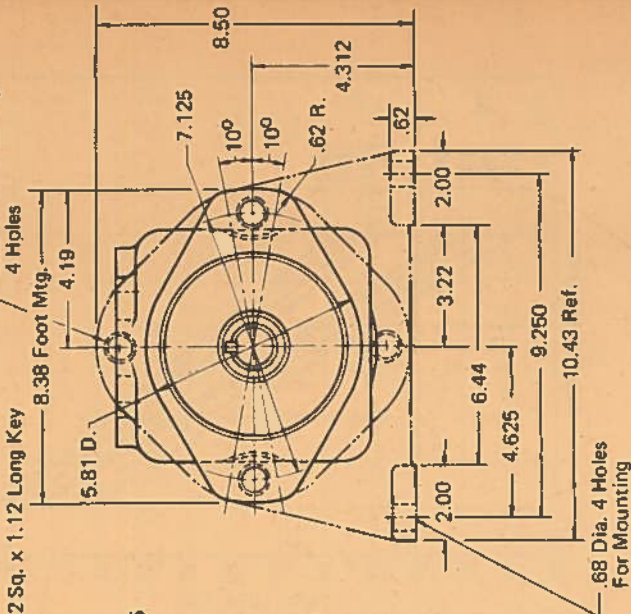
Outlet, Assembled In Line With Inlet,  
Is Designated By "C" In Model Number.

Refer To Model Code On Reverse Side  
For Other Locations.

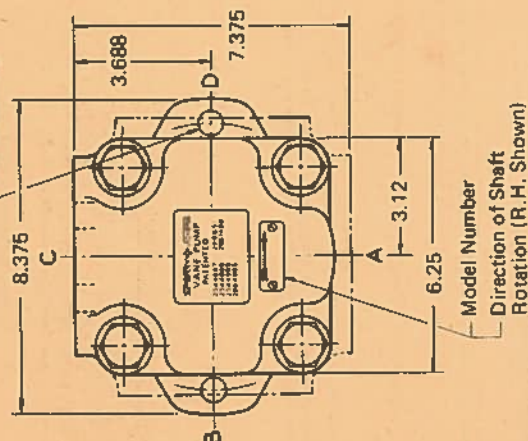
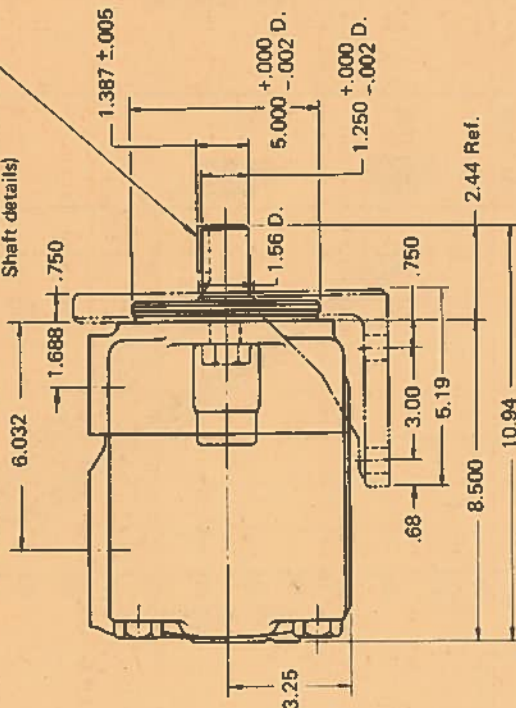
.688 Dia. 2 Holes  
For Mounting



1.50 Dia. Outlet  
Connection  
Accepts Sperry Vickers  
Model FL1-12-12P-10 or  
FL1-12-12W-10 Flange



(See page 2 for No. 86  
Shaft details)



Model Number  
Direction of Shaft  
Rotation (R.H. Shown)

MODEL 45\*\*A-1C10-18\*  
(STANDARD 2-BOLT FLANGE OR FOOT MOUNTING)

# SPERRY-VICKERS HIGH PERFORMANCE SINGLE PUMPS

SERIES 45V-\*.18" FIXED DISPLACEMENT - VANE TYPE  
FOR USE WITH OIL OR WATER GLYCOL, SYNTHETIC,  
AND WATER-IN-OIL EMULSION FIRE RESISTANT FLUIDS

Maximum Speed (RPM) When Used With Fluid Types	Maximum Pressures (PSI) When Used With Fluid Types			
	Petro- leum Oil	Synthetic Water & Glycol in-oil Emulsion	Petro- leum Oil	Synthetic Water Glycol Emulsion
1800			2500*	2000
1200			2000	1000

\* 2500 PSI at 1200 RPM  
2200 PSI at 1800 RPM

.625-11 UNC-2B Tap  
4 Holes

REVISED 11-1-78

503000

SPERRY-VICKERS  
TROY, MICHIGAN 48064

PUMPS  
SINGLE

FIXED  
DISPLACEMENT

VANE TYPE  
SERIES 45V

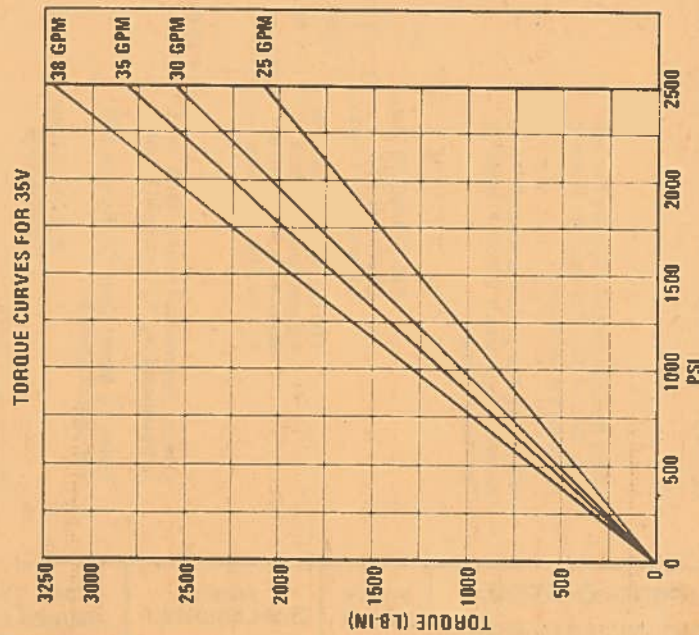
NOMINAL  
42 TO 60 GPM

2-BOLT FLANGE  
OR FOOT MOUNTING

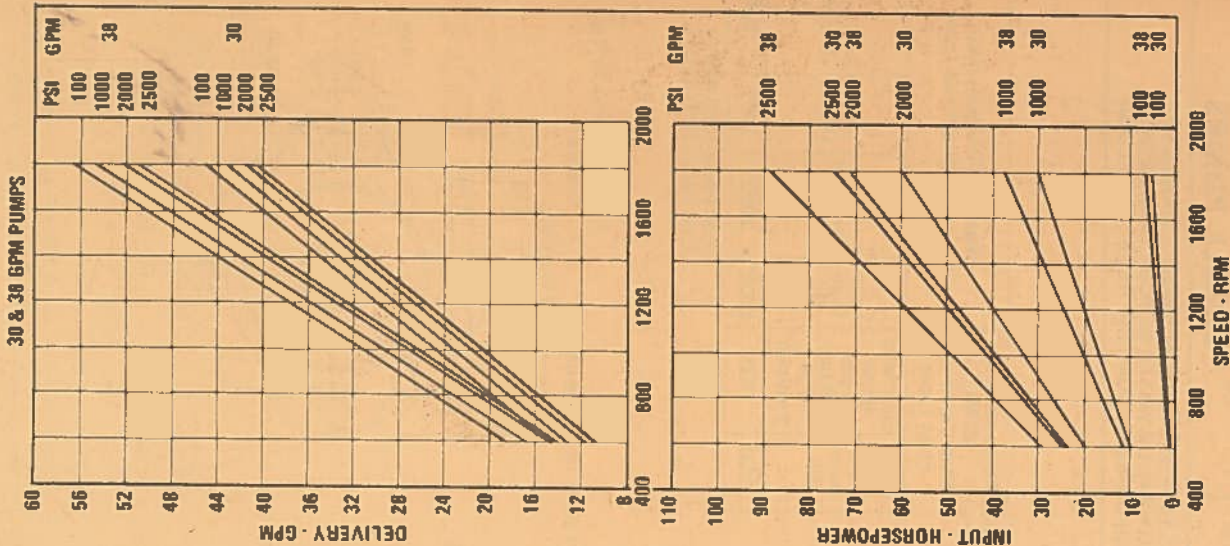
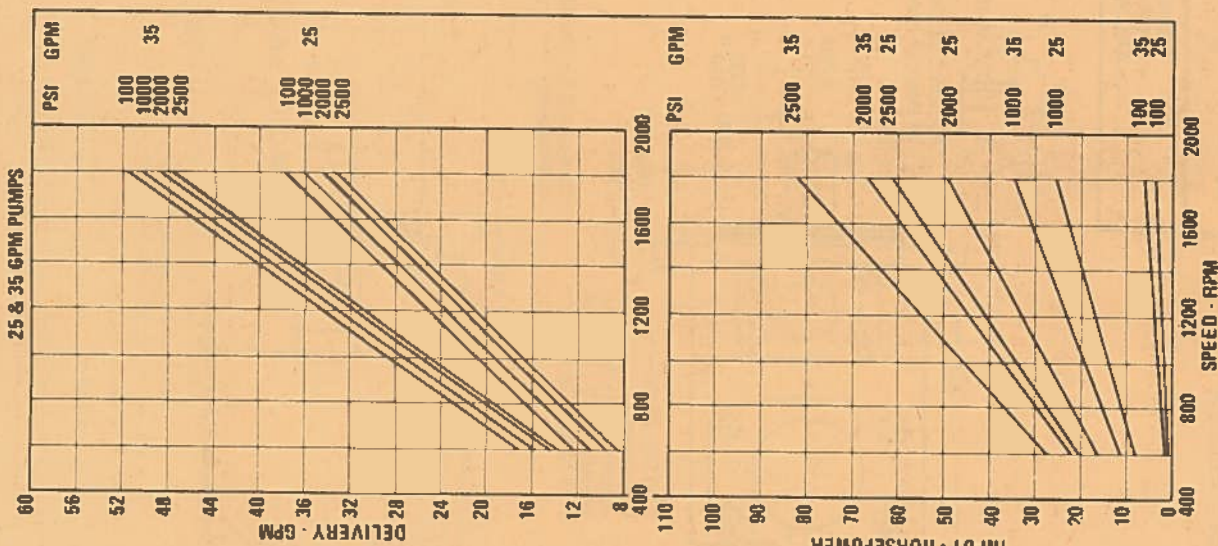
DWG. NO.  
503000



STANDARD GRAPHICAL  
SYMBOL FOR FLUID  
POWER DIAGRAM



TYPICAL PERFORMANCE CURVES (35V)  
DATA BASED ON OPERATION WITH  
SAE 10W ANTI-WEAR OIL AT 120°F.





Series 45V pumps are of Sperry Vickers "balanced vane type" construction.

SAE 4-Bolt Connection Pads Are For Use  
With SAE 4-Bolt Flanges, See Drawing  
1-250700 For Selection.

**4-Bolt SAE Flange Connections Will Also Accommodate User's 2-Bolt Flanges Of The Proper Design.**

Outlet, Assembled In Line With Inlet,  
Is Designated By "C" In Model Number.

Refer To Model Code On Reverse Side  
For Other Locations.

Refer To Model Code On Reverse Side  
For Other Locations.

Model Number  
Direction of Shaft  
Rotation (R.H. Shown)

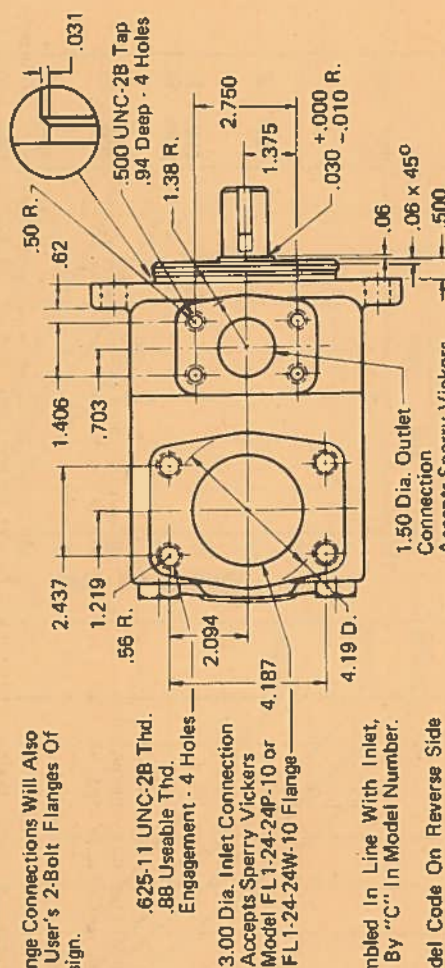
## HIGH PERFORMANCE SINGLE PUMPS

STERN-VICKERS

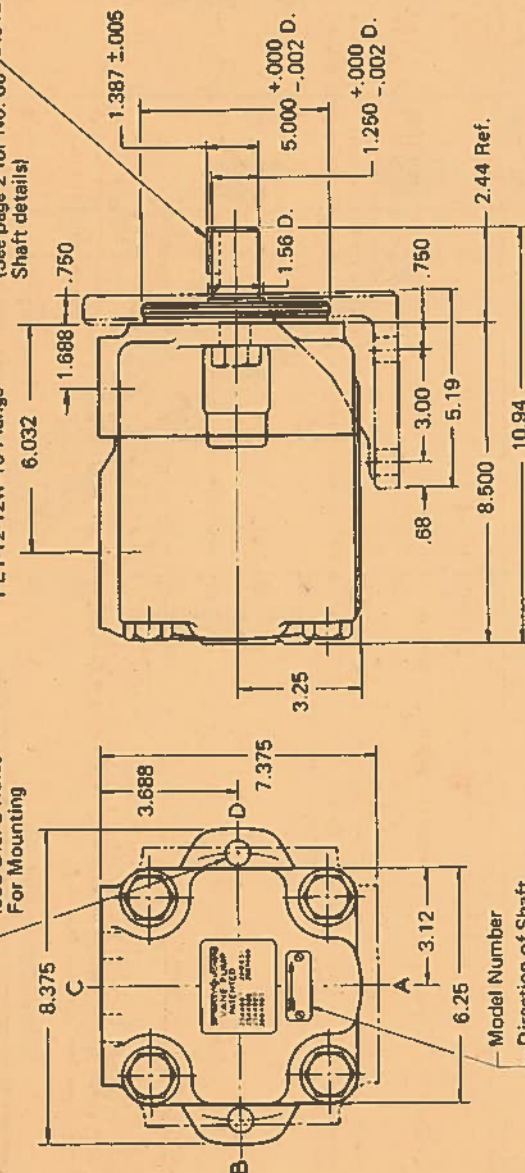
**SERIES 45V.\*-18\* FIXED DISPLACEMENT - VANE TYPE  
FOR USE WITH OIL OR WATER GLYCOL, SYNTHETIC,  
AND WATER-IN-OIL EMULSION FIRE RESISTANT FLUIDS**

Maximum Speed (RPM) When Used With Fluid Types		Maximum Pressures (PSI) When Used With Fluid Types			
Petro- leum Oil	Synthetic Water Glycol & Water- in-oil Emulsion	Petro- leum Oil	Synthetic	Water Glycol	Water-in-oil Emulsion
1800	1200	2500*	2000	2000	1000

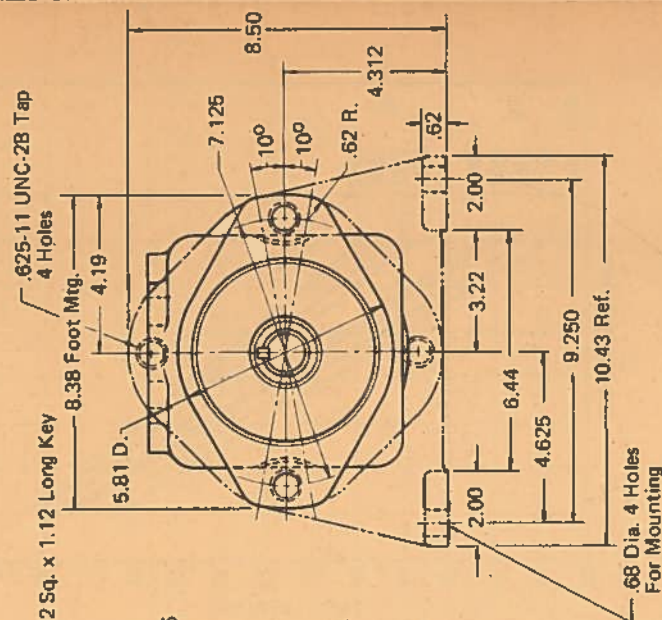
\*2500 PSI at 1200 RPM  
2200 PSI at 1800 RPM



(See page 2 for No. 86 — .312 Sq. x 1.12 Long Key Shaft details)



**MODEL 45\*\*A-1C10-18\***  
**(STANDARD 2-BOLT FLANGE OR FOOT MOUNTING)**



REVISED 11-1-78

503000



## General Data

Series 45V pumps are of Sperry Vickers "balanced vane type" construction.

## Filtration (Mandatory)

..... 25 Microns or Less

## Drive Data

### Shaft Rotation

Pumps are normally assembled for right hand or clockwise rotation as viewed from the shaft end.

If left hand or counterclockwise rotation is required, specify by adding the symbol "L" to the model number.

Example: 45V60A-1C10L-180

Inlet and outlet ports remain the same regardless of direction of shaft rotation. Change of assembly of internal parts if necessary when change of shaft rotation is required.

## Pump Drive

Pump is recommended for direct coaxial drive. If drives imposing radial shaft loads are considered, consult your Sperry Vickers sales representative.

## Minimum Recommended Drive Speed

..... 600 RPM

Maximum Speed Ratings and Inlet Vacuum are tabulated for four types of fluid. These are influenced by specific gravity, viscosity and suction head. Pump suction and speed should be related so that vacuum at pump inlet does not exceed 5" of mercury for petroleum oil and water glycol; 3" for synthetic and water-in-oil emulsion fluids.

## Ratings

### Maximum Speed (RPM)

Petroleum Oil..... 1800  
Synthetic, Water Glycol and Water-in-oil Emulsion..... 1200

### Maximum Pressure (PSI)

Petroleum Oil..... \*2500  
Synthetic..... 2000  
Water Glycol..... 2000  
Water-in-oil Emulsion..... 1000  
\*2500 PSI at 1200 RPM; 2200 PSI at 1800 RPM.

## Special Information

Note: Do not run a pump with the outlet pressure lower than the inlet pressure. This causes operating noise and vane instability.

## Air Bleed

At time of first starting, if the pump does not immediately prime, air should be bled from pump delivery line. This may be accomplished by loosening a connection in the delivery line close to the pump until oil flows, indicating pump has primed. An airbleed valve is available for this purpose. See drawing 521601.

## Caution:

There is no case drain connection. The pump is drained internally into its inlet. System pressure at the pump inlet connection may not exceed 20 PSI.

## Fluids and Temperature Data

Petroleum Oils - Use antiwear industrial hydraulic oils or automotive crankcase oils having letter designations SC, SD or SE.

Running viscosity range 70 to 250 SUS. Operating temperature 120°F. recommended, 150°F. usual maximum.

For details, refer to hydraulic fluid and temperature recommendations for industrial machinery, data sheet I-286-S in catalogue.

**Water Glycols** - Select fluids with an operating viscosity of the petroleum oil described above. Recommended maximum temperature 130°F.

**Water-in-oil Emulsion** may be used however, they require careful selection and monitoring of the fluid. For assistance contact Sperry Vickers representative. Soluble oil-in-water solutions not recommended.

**Synthetic Fire Resistant Fluids** - Phosphate esters and their blends with operating viscosity of the petroleum oil described above. These fluids are generally compatible with fluorocarbon and silicone elastomers. Add F3 prefix to the model number.

## Sound Data (With 60 GPM Ring)

Sound level is 71 db(A) at 1200 RPM and 2000 PSI using SAE 10W oil at 120°F. 5" Hg inlet. Tested per ISO-draft international standard 4412.

## Ordering Instructions

Select pumps according to the typical model code shown. Available standard options are listed in this code.

## Electric Motor Pumps

Many motor manufacturers are prepared to furnish drip proof or totally enclosed motors with end bells on which this pump can be mounted.

## Weight Lbs. (Approx.)

45V\*\*\*10-180 (Std. 2-Bolt Mounting)..... 75  
45V\*\*\*10-181 (Foot Mounting)..... 88

## Typical Model Code

With Multi  
Fluid Seals (Omit  
If Not Required)

## Series Designation

45 - Standard Gearing

## Vane Pump

## SAE Rated Capacity

(1200 RPM - 100 PSI)

42 - 42 GPM 60 - 60 GPM

50 - 50 GPM

## Port Connections

SAE 4-Bolt

## Shaft Type

1 - Straight Keyed (Standard)

86 - Optional

## Outlet Position (Viewed From Cover End)

A - Outlet Opposite Inlet

B - Outlet 90° Counterclockwise From Inlet

C - Outlet Inline With Inlet

D - Outlet 90° Clockwise From Inlet

Special Features Suffix  
180 - Flange Mounting  
181 - Foot Mounting  
Foot Kit - FB-C-10

Rotation (Viewed From Shaft  
End)  
L - Left Hand  
(Right Hand Rotation Need  
Not Be Specified In Model)

Design Number  
Design Number Subject To Change.  
Installation Dimensions Remain The  
Same For Design Numbers 10 Thru  
19.

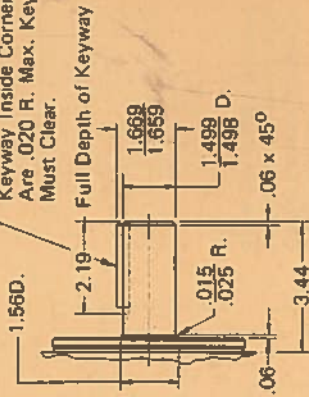


STANDARD GRAPHICAL  
SYMBOL FOR FLUID  
POWER DIAGRAM

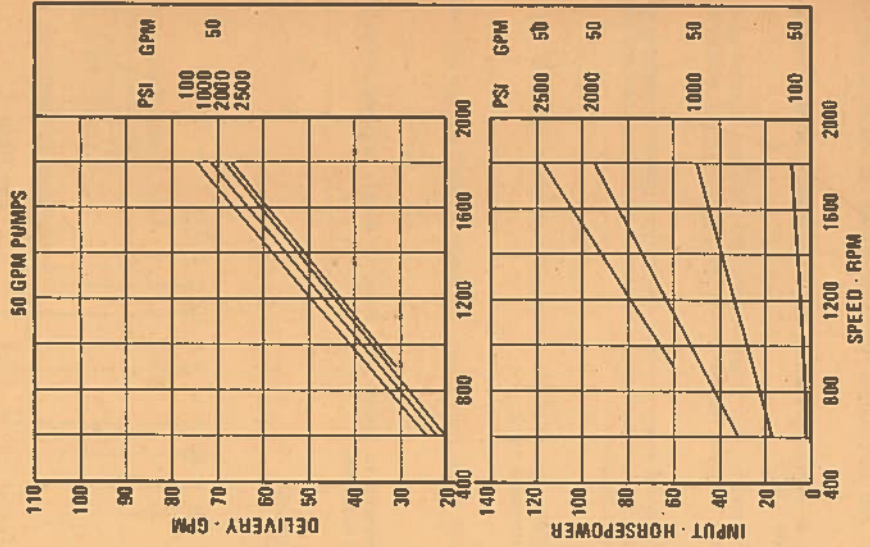
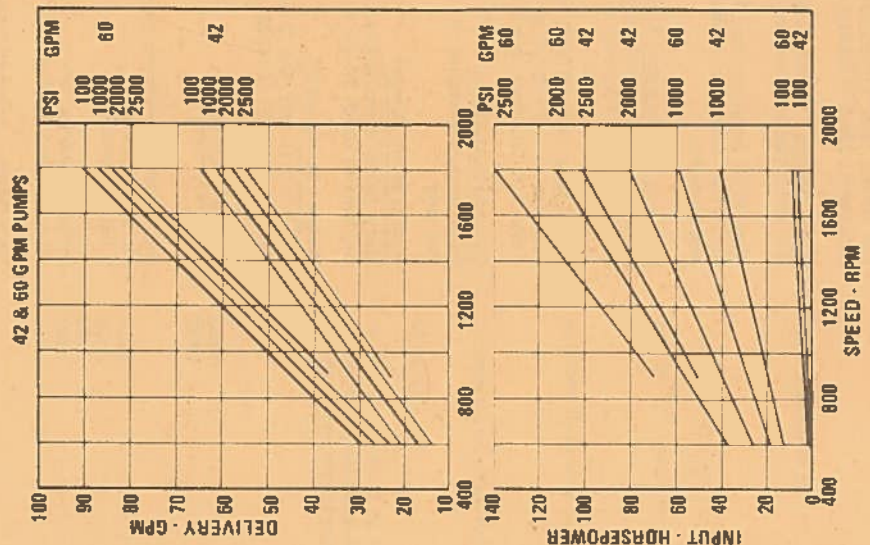
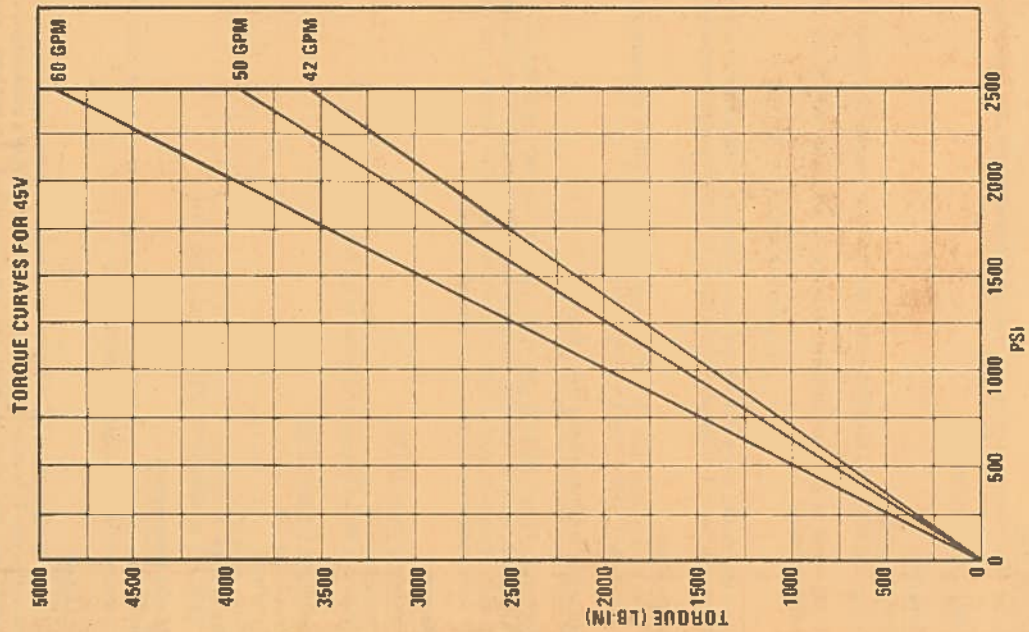


NO. 86 SHAFT

.375 Sq. x 2.000 Long Key  
Keyway Inside Corner Fillets  
Are .020 R. Max. Key Corners  
Must Clear.



TYPICAL PERFORMANCE CURVES (45V)  
DATA BASED ON OPERATION WITH  
SAE 10W ANTI-WEAR OIL AT 120°F.





# **SPERRY-VICKERS HIGH PERFORMANCE SINGLE PUMPS**

SERIES 50V-A-1C10-13\*  
FIXED DISPLACEMENT - VANE TYPE  
FOR USE WITH OIL OR SYNTHETIC FIRE RESISTANT FLUIDS

OUTLET, ASSEMBLED IN LINE WITH INLET, IS DESIGNATED BY "C" IN MODEL NUMBER.

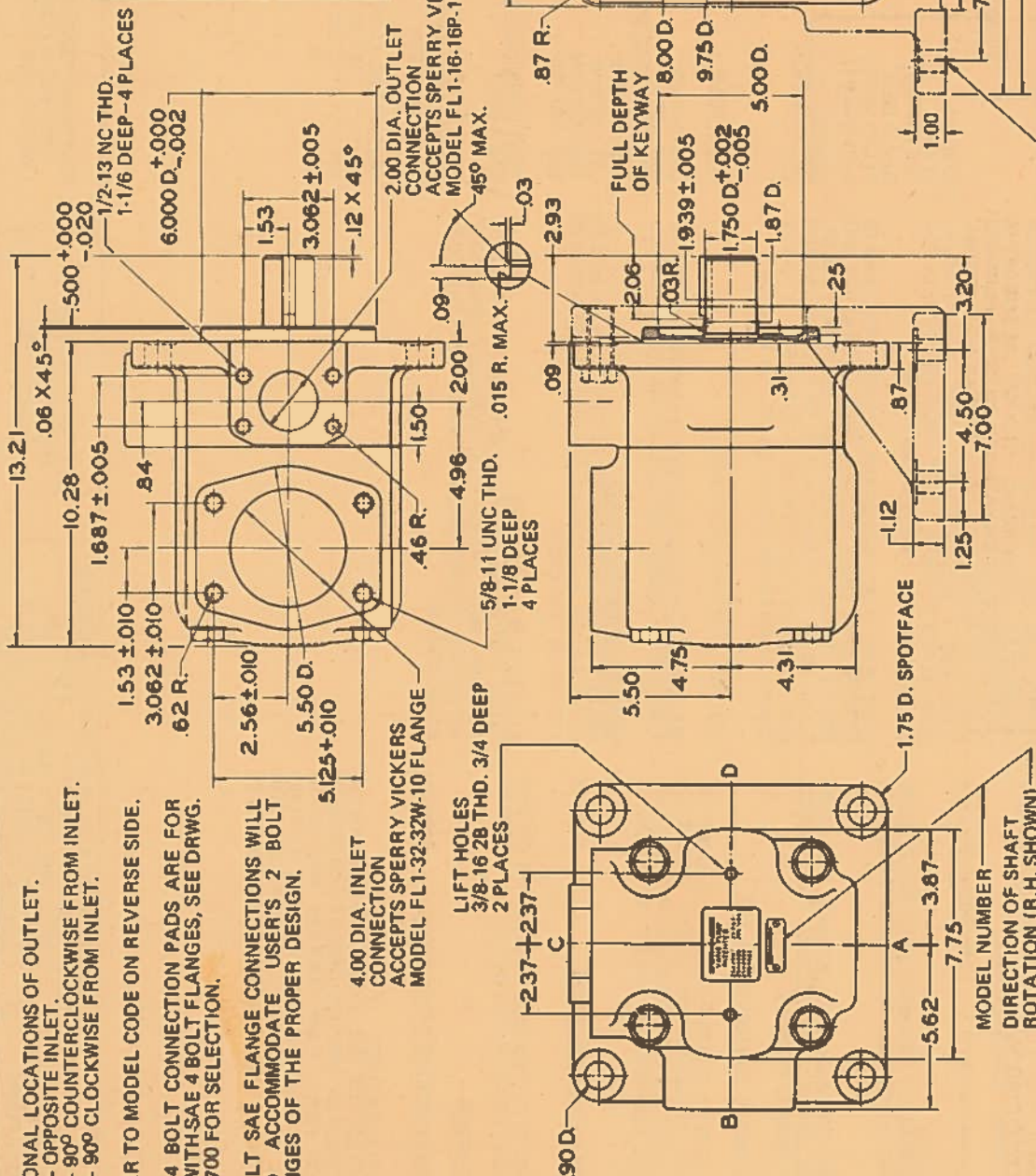
OPTIONAL LOCATIONS OF OUTLET.

"A" - OPPOSITE INLET.  
"B" - 90° COUNTERCLOCKWISE FROM INLET.  
"D" - 90° CLOCKWISE FROM INLET.

REFER TO MODEL CODE ON REVERSE SIDE.

SAE 4 BOLT CONNECTION PADS ARE FOR USE WITH SAE 4 BOLT FLANGES, SEE DRWG. 1-250700 FOR SELECTION.

4 BOLT SAE FLANGE CONNECTIONS WILL ALSO ACCOMMODATE USER'S 2 BOLT FLANGES OF THE PROPER DESIGN.



MODEL 50V-A-1C10-13\*  
(4-BOLT FLANGE OR FOOT MOUNTING)

REVISED 1-2-76

503200

SPERRY-VICKERS  
TROY, MICHIGAN 48064

PUMPS  
SINGLE

FIXED  
DISPLACEMENT

VANE TYPE  
SERIES 50V

NOMINAL  
73 TO 109 GPM

FOOT OR FLANGE  
MOUNTING

DWG. NO.  
503200

SEC.  
b



# GENERAL DATA

SERIES 50V PUMPS ARE OF SPERRY VICKERS "BALANCED VANE TYPE" CONSTRUCTION.

FILTRATION (MANDATORY). . . 25 MICRONS OR LESS

## SHAFT ROTATION

PUMPS ARE NORMALLY ASSEMBLED FOR RIGHT HAND OR CLOCKWISE ROTATION AS VIEWED FROM THE SHAFT END.

IF LEFT HAND OR COUNTERCLOCKWISE ROTATION IS REQUIRED, SPECIFY BY ADDING THE SYMBOL "L" TO THE MODEL NUMBER.

EXAMPLE: 50V109A-1C10L-130

INLET AND OUTLET PORTS REMAIN THE SAME REGARDLESS OF DIRECTION OF SHAFT ROTATION. CHANGE OF ASSEMBLY OF INTERNAL PARTS IS NECESSARY WHEN CHANGE OF SHAFT ROTATION IS REQUIRED.

MAXIMUM OPERATING PRESSURE. . . . . 1700 PSI

WITH SYNTHETIC FLUIDS (SEE PARAGRAPH ON SYNTHETIC FLUIDS). CONTINUOUS DUTY. . . . . 1500 PSI

## INPUT DRIVE SPEED

MINIMUM RECOMMENDED DRIVE SPEED. . . . . 600 RPM

## MAXIMUM SPEED RATINGS

ARE TABULATED FOR TWO TYPES OF FLUID. THESE ARE INFLUENCED BY SPECIFIC GRAVITY, VISCOSITY AND SUCTION HEAD. PUMP SUCTION AND SPEED SHOULD BE RELATED SO THAT VACUUM AT PUMP INLET DOES NOT EXCEED 4" OF MERCURY FOR PETROLEUM OIL; 3" FOR PHOSPHATE ESTER FLUID.

## FLUID

PETROLEUM OIL - CLEAN PETROLEUM ANTIWEAR INDUSTRIAL HYDRAULIC OIL OR AUTOMOTIVE CRANKCASE OIL DESIGNATED SC, SD OR SE. RUNNING VISCOSITY RANGE 70-250 SUS. OPERATING TEMPERATURE 120° F. RECOMMENDED, 150° F. USUAL MAXIMUM. REFER TO DATA SHEET 1-286-S (SECTION L) FOR HYDRAULIC OIL RECOMMENDATIONS.

SYNTHETIC FIRE RESISTANT FLUIDS - PHOSPHATE ESTERS AND THEIR BLENDS WITH OPERATING VISCOSITY OF THE PETROLEUM OIL DESCRIBED ABOVE. FLUID MUST BE COMPATIBLE WITH FLUOROCARBON AND SILICONE ELASTOMERS. ADD PREFIX F3 TO THE MODEL NUMBER. EXAMPLE: F3-50V\*\*A-1C10-130

SEE NOTE ON MAXIMUM SPEED.

WATER-CONTAINING FLUIDS NO FLUIDS WHICH CONTAIN WATER SHOULD BE USED WITH THESE PUMPS.

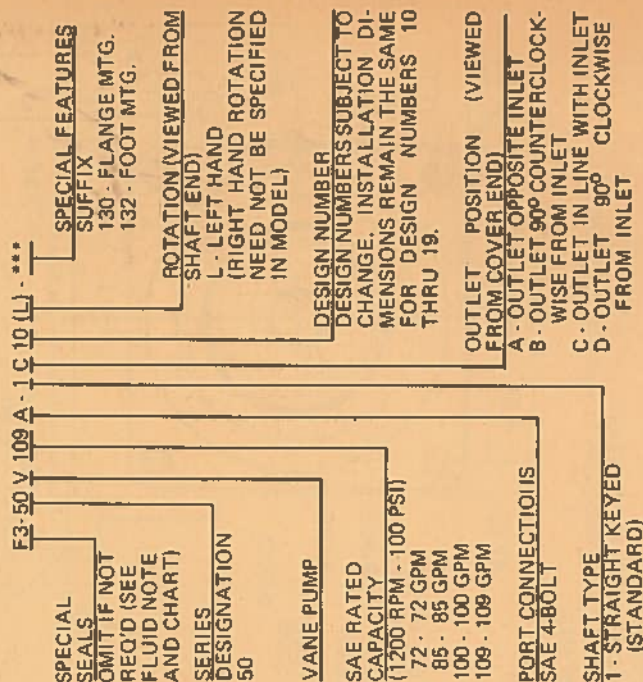
## ORDERING INSTRUCTIONS

SELECT PUMPS ACCORDING TO THE TYPICAL MODEL CODE SHOWN. AVAILABLE STANDARD OPTIONS ARE LISTED IN THIS CODE.

## ELECTRIC MOTOR PUMPS

MANY MOTOR MANUFACTURERS ARE PREPARED TO FURNISH DRIP PROOF OR TOTALLY ENCLOSED MOTORS WITH END BELLS ON WHICH THIS PUMP CAN BE MOUNTED.

## TYPICAL MODEL CODE



WEIGHT LBS. (APPROX.)  
 50V\*\*\*\*\*\*10-130 (STD. 4-BOLT MTG.)..... 138  
 50V\*\*\*\*\*10-132 (FOOT MTG.)..... 208

PUMP SERIES AND RING SIZE (SEE MODEL CODE)	PERFORMANCE DATA (NOMINAL) BASED ON OPERATION AT 1200 RPM, OIL TEMPERATURE 120° F, VISCOSITY 150 SSU AT 100° F. CHARACTERISTICS AT OTHER SPEEDS APPROXIMATELY PROPORTIONAL						MAXIMUM SPEED (RPM) WHEN USED WITH FLUID TYPES		MAXIMUM PRESSURES (PSI) WHEN USED WITH FLUID TYPES	
	100 PSI		1000 PSI		1700 PSI		PETROLEUM OIL	SYNTHETIC	PETROLEUM OIL	SYNTHETIC
	GPM	INPUT HP	GPM	INPUT HP	GPM	INPUT HP				
50V72*-1C10-130/132	72	6.5	68.5	46.0	65.0	75	1800	1200	1700	1500
50V85*-1C10-130/132	85	8.0	82.0	55.0	79.0	91.5				
50V100*-1C10-130/132	100	10.0	98.0	68.0	95	110				
50V109*-1C10-130/132	109	10.0	106.0	71.0	102.5	118.0				

STANDARD GRAPHICAL SYMBOL FOR FLUID POWER DIAGRAM



503200-1



General Data

Series 2520V pumps are of Sperry Vickers "balanced vane type" construction.

Ratings

Maximum Speed (RPM)

Petroleum Oil.....1800  
Synthetic and Water Glycol.....1200

Maximum Pressure (PSI)

Petroleum Oil... (2 & 14 Ring Sizes - Cover End).....2000  
(12 Ring Size - Cover End).....2300  
(5, 8 & 11 Ring Sizes - Cover End).....3000

Synthetic..... (12, 14, 17 & 21 Ring Sizes - Shaft End).....2500  
(14 Ring Size - Cover End).....1800  
(2, 5, 8, 11 & 12 Ring Sizes - Cover End).....2000  
(12, 14, 17 & 21 Ring Sizes - Shaft End).....2000

Water Glycol... (14 Ring Size - Cover End).....1800  
(2, 5, 8, 11 & 12 Ring Sizes - Cover End).....2000  
(12, 14, 17 & 21 Ring Sizes - Shaft End).....2000

2.50 Dia. Inlet Connection  
Accepts Sperry Vickers Model  
FL1-20-20P-10 or FL1-20-20W-10 Flange

SAE 4-Bolt Connection Pads Are For Use  
With SAE 4-Bolt Flanges. See Drawing  
I-250700 For Selection.

SAE Straight Thread Connections Are  
For Use With SAE Hydraulic Fittings  
And "O" Ring Seals.

4-Bolt SAE Flange Connections Will Also  
Accommodate User's 2-Bolt Flanges Of  
The Proper Design.

Optional Str. Thd. Conn.  
1.0625-12 UN-2B Thread For  
SAE Hyd. Fittings

View AA  
375-16 UNC-2B Thd.  
75 Deep - 4 Holes

1.000 Dia. Outlet  
Connection No. 1  
Accepts Sperry Vickers  
Model FL1-8-08P-10 or  
FL1-8-08W-10 Flange

375-16 UNC-2B Thd.  
75 Deep - 4 Holes

3.50 D.  
50 R.

1.031  
516

2.312  
41 R.

1.06 R.

1.000  
2.000

1.093 D.  
+.000  
-.010 R.

.06 x 45°

.06 x 45°

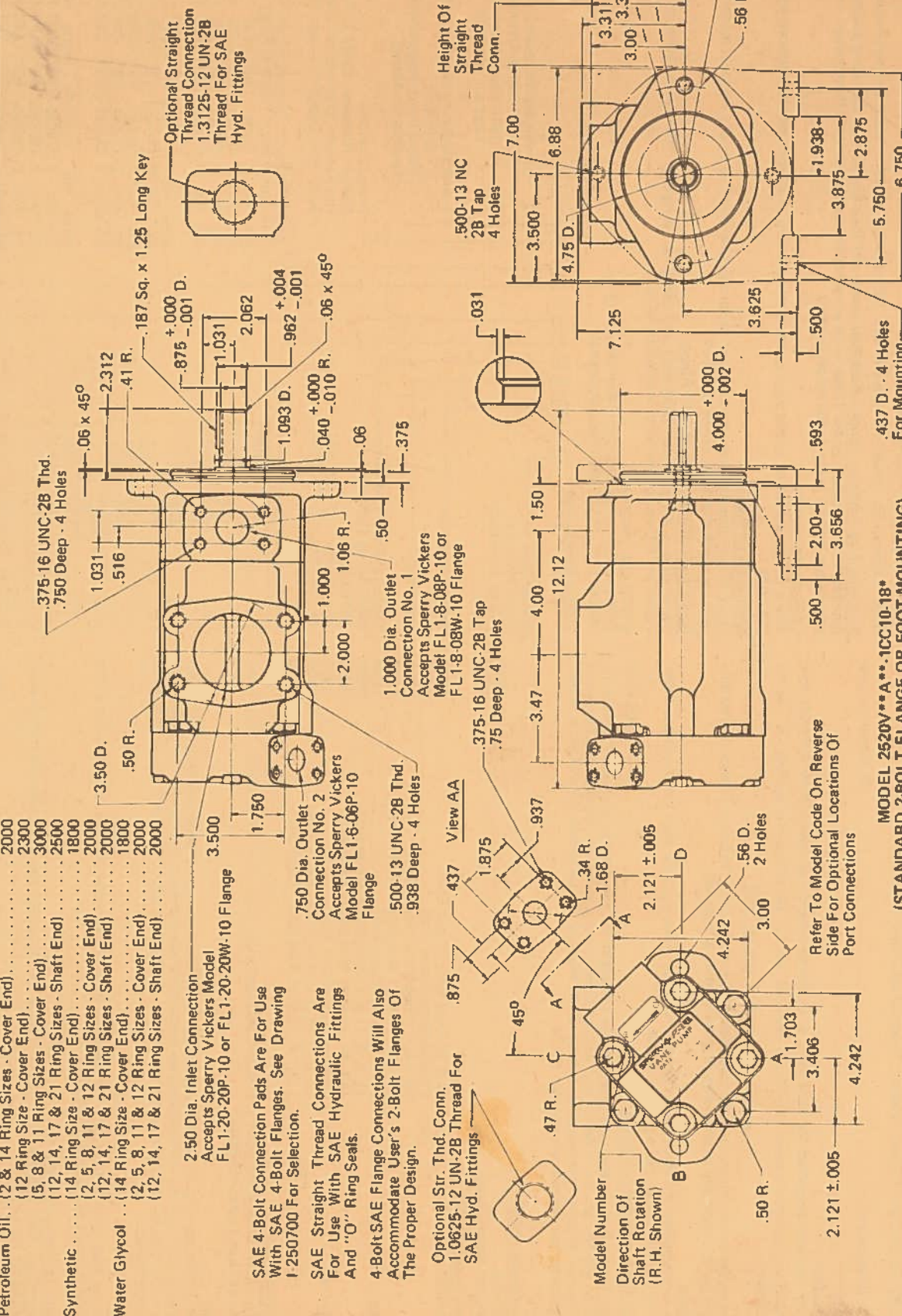
.187 Sq. x 1.25 Long Key

Optional Straight  
Thread Connection  
1.3125-12 UN-2B  
Thread For SAE  
Hyd. Fittings

# SPERRY VICKERS T.M.

## HIGH PERFORMANCE DOUBLE PUMPS

SERIES 2520V - 18° FIXED DISPLACEMENT - VANE TYPE  
FOR USE WITH OIL OR WATER GLYCOL AND  
SYNTHETIC FIRE RESISTANT FLUIDS



Refer To Model Code On Reverse  
Side For Optional Locations Of  
Port Connections

MODEL 2520V\*\*A\*\* 1CC10-18°

(STANDARD 2-BOLT FLANGE OR FOOT MOUNTING)

REVISED 11-1-78

504000

SPERRY VICKERS  
TROY, MICHIGAN 48084

PUMPS  
DOUBLE

FIXED  
DISPLACEMENT

VANE  
TYPE

COVER END 2-14 GPM  
SHAFT END 12-21 GPM

2-BOLT FLANGE  
OR FOOT MOUNTING

DWG. NO.  
504000

SEC.  
b



## General Data

Series 2520V pumps are of Sperry Vickers "balanced vane type" construction.

## Filtration (Mandatory)

..... 25 Micron or Less

## Drive Data

### Shaft Rotation

Pumps are normally assembled for right hand or clockwise rotation as viewed from the shaft end. If left hand or counterclockwise rotation is required, specify by adding the symbol "L" to the model number.

Example: 2520V21A11-1CC10L-180

Inlet and outlet ports remain the same regardless of direction of shaft rotation. Change of assembly of internal parts is necessary when change of shaft rotation is required.

## Pump Drive

Pump is recommended for direct coaxial drive. If drives imposing radial shaft loads are considered, consult your Sperry Vickers sales representative.

## Minimum Recommended Drive Speed

..... 600 RPM

**Maximum Speed Ratings and Inlet Vacuum** are tabulated for three types of fluid. These are influenced by specific gravity, viscosity and suction head. Pump suction and speed should be related so that vacuum at pump inlet does not exceed 5" of mercury for petroleum oil and water glycol; 3" for synthetic and water-in-oil emulsion fluids.

## Ratings

### Maximum Speed (RPM)

Petroleum Oil..... 1800

Synthetic and Water Glycol..... 1200

### Maximum Pressure (PSI)

Petroleum Oil..... (2 & 14 Ring Sizes - Cover End)..... 2000

..... (12 Ring Size - Cover End)..... 2000

..... (5, 8 & 11 Ring Sizes - Cover End)..... 3000

..... (12, 14, 17 & 21 Ring Sizes - Shaft End)..... 2500

Synthetic..... (14 Ring Size - Cover End)..... 1800

..... (2, 5, 8, 11 & 12 Ring Sizes - Cover End)..... 2000

..... (12, 14, 17 & 21 Ring Sizes - Shaft End)..... 2000

Water Glycol..... (14 Ring Size - Cover End)..... 1800

..... (12, 5, 8, 11 & 12 Ring Sizes - Cover End)..... 2000

..... (12, 14, 17 & 21 Ring Sizes - Shaft End)..... 2000

## Special Information

**Note:** Do not run a pump with the outlet pressure lower than the inlet pressure. This causes operating noise and vane instability.

## Air Bleed

At time of first starting, if the pump does not immediately prime, air should be bled from pump delivery line. This may be accomplished by loosening a connection in the delivery line close to the pump until oil flows, indicating pump has primed. An airbleed valve is available for this purpose. See drawing 521601.

## Caution:

There is no case drain connection. The pump is drained internally into its inlet. Pressure at the pump inlet connection may not exceed 20 PSI.

## Fluids and Temperature Data

**Petroleum Oils** - Use antiwear industrial hydraulic oils or automotive crankcase oils having letter designations SC, SD or SE.

Running viscosity range 70 to 250 SUS. Operating temperature 120°F. recommended, 150°F. usual maximum.

For details, refer to hydraulic fluid and temperature recommendations for industrial machinery, data sheet 1-286-S in catalogue.

**Water Glycols** - Select fluids with an operating viscosity of the petroleum oil described above. Recommended maximum temperature 130°F.

**Note:** Water-in-oil (inwert) emulsions, and 5% solution of oil-in-water are not recommended. Synthetic Fire Resistant Fluids - Phosphate esters and their blends with operating viscosity of the petroleum oil described above. These fluids are generally compatible with fluorocarbon and silicone elastomers. Add F3 prefix to the model number.

## Ordering Instructions

Select pumps according to the typical model code shown. Available standard options are listed in this code.

## Electric Motor Pumps

Many motor manufacturers are prepared to furnish drip proof or totally enclosed motors with end bells on which this pump can be mounted.

## Sound Data (With 21 and 14 GPM Rings)

Sound level is 68 db(A) at 1200 RPM and 2000 PSI using SAE 10W oil at 120°F. 5" Hg inlet. Tested per ISO-draft international standard 4412.

## Weight Lbs. (Approx.)

2520V.....10-180 (Std. 2-Bolt Mounting)..... 45

2520V.....10-181 (Foot Mounting)..... 51

## Typical Model Code

F3 - 2520 V 21 A 11 - 1 CC 10 L - \*\*\*

## Special Seals

Omit If Not Re-

quired. See Fluids

Note

## Series Designation

Vane Pump

Capacity - Shaft End Pump

(SAE Rating 1200 RPM -

100 PSI)

12 - 12 GPM 17 - 17 GPM

14 - 14 GPM 21 - 21 GPM

Port Connections

Inlet

Outlet

No. 1

No. 2

SAE

4-Bolt

Flg.

SAE

Str.

Thd.

SAE

4-Bolt

Flg.

SAE

Str.

Thd.

SAE

4-Bolt

Flg.

Capacity - Cover End Pump

(SAE Rating 1200 RPM - 100 PSI)

2 - 2 GPM 11 - 11 GPM

5 - 5 GPM 12 - 12 GPM

8 - 8 GPM 14 - 14 GPM

Shaft Type

1 - Straight Keyed Standard

Special Features Suffix

180 - Flange Mounting

181 - Foot Mounting

Foot Kit - FB-B-10

Rotation (Viewed From Shaft End)

L - Left Hand

(Right Hand Rotation Need Not Be

Specified In Model)

Design Number

Design Numbers Subject To Change.

Installation Dimensions Remain The

Same For Design Numbers 10 Thru 19.

Outlet Positions (Viewed From Cover End)

(With Outlet No. 1 Opposite Inlet)

AA No. 2 Outlet 135° CCW From Inlet

AB No. 2 Outlet 45° CCW From Inlet

AC No. 2 Outlet 45° CW From Inlet

AD No. 2 Outlet 135° CW From Inlet

(With No. 1 Outlet 90° CCW From Inlet)

BA No. 2 Outlet 135° CCW From Inlet

BB No. 2 Outlet 45° CCW From Inlet

BC No. 2 Outlet 45° CW From Inlet

BD No. 2 Outlet 135° CW From Inlet

(With No. 1 Outlet Inline With Inlet)

CA No. 2 Outlet 135° CCW From Inlet

CB No. 2 Outlet 45° CCW From Inlet

CC No. 2 Outlet 45° CW From Inlet

CD No. 2 Outlet 135° CW From Inlet

(With No. 1 Outlet 90° CCW From Inlet)

DA No. 2 Outlet 135° CCW From Inlet

DB No. 2 Outlet 45° CCW From Inlet

DC No. 2 Outlet 45° CW From Inlet

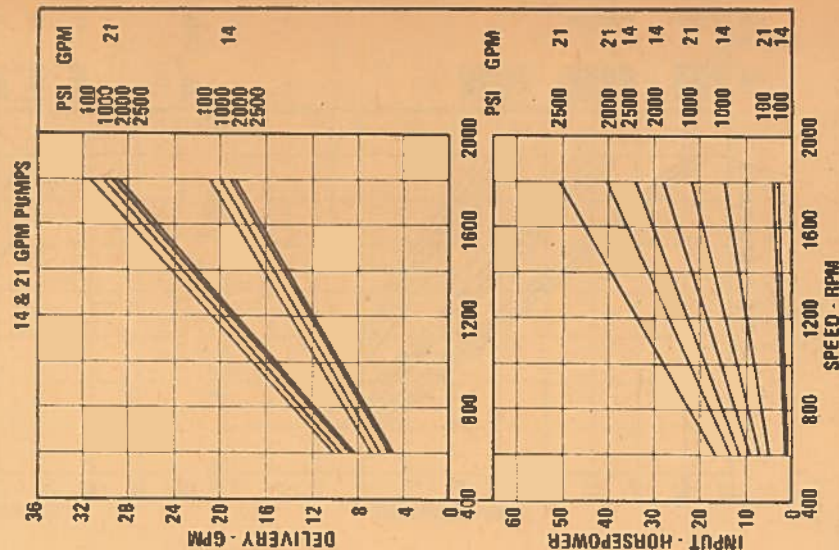
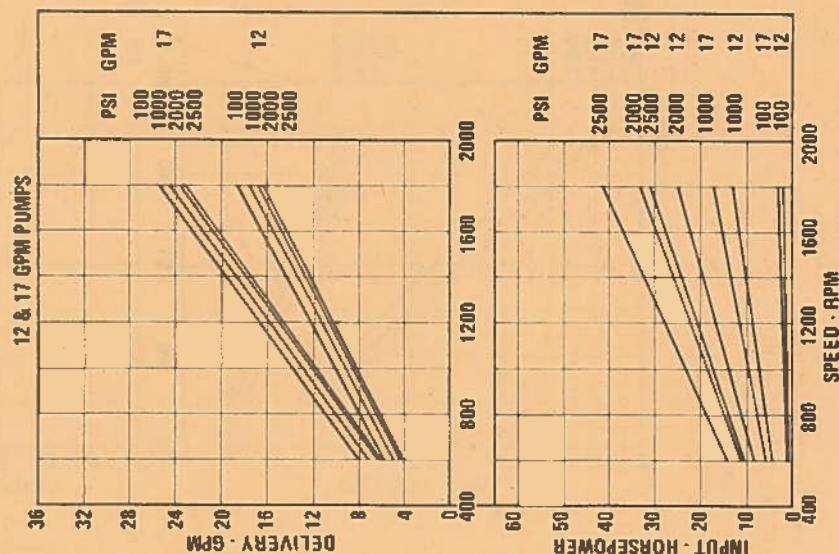
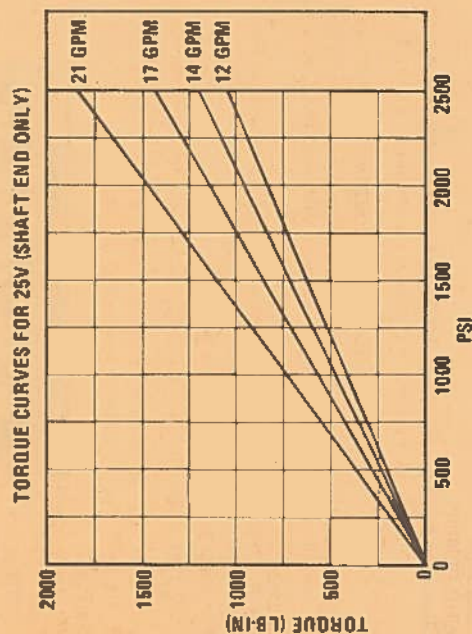
DD No. 2 Outlet 135° CW From Inlet

504000-1



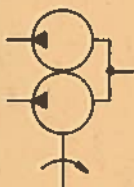
TYPICAL PERFORMANCE CURVES 2620V (SHAFT END)  
DATA BASED ON OPERATION WITH  
SAE 10W ANTI-WEAR OIL AT 120°F.

● Note: Maximum allowable torque on shaft not more than 2800 lb. in. Check torque from each pump cartridge and add, if both pumps are under pressure at the same time.





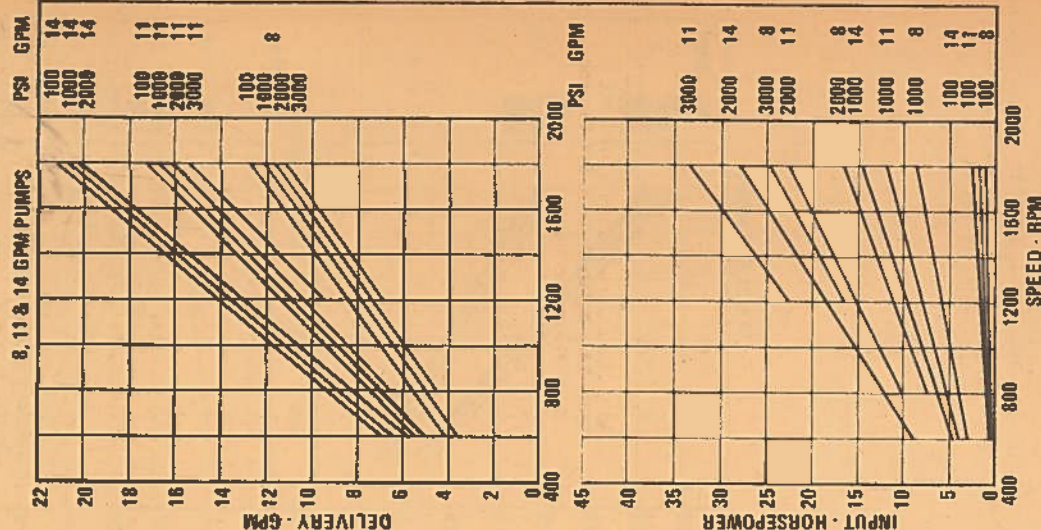
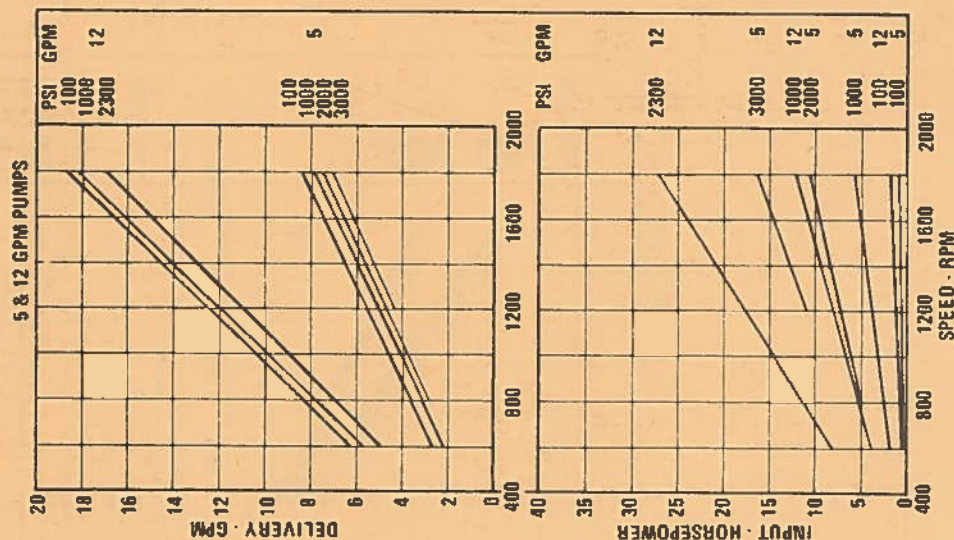
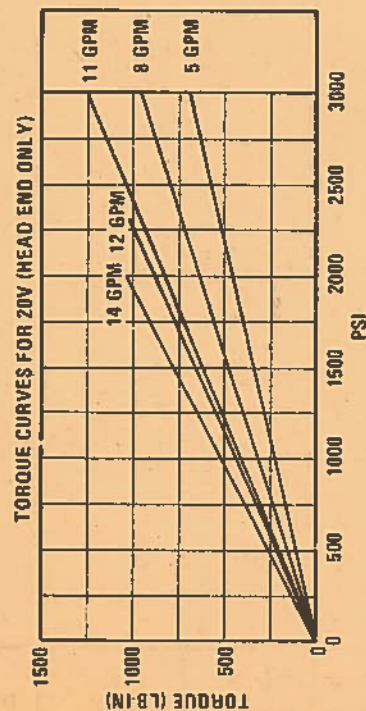
STANDARD GRAPHICAL  
SYMBOL FOR FLUID  
POWER DIAGRAM



TYPICAL PERFORMANCE CURVES 2520V (HEAD END)  
DATA BASED ON OPERATION WITH  
SAE 10W ANTI-WEAR OIL AT 120°F.

2 GPM RING SIZE - 1800 RPM					
100 PSI		1000 PSI		2000 PSI	
GPM	HP	GPM	HP	GPM	HP
3.7	.54	3.3	3.54	2.9	6

● Note: Maximum allowable torque on shaft not more than 2800 lb. in. Check torque from each pump cartridge and add, if both pumps are under pressure at the same time.









## General Data

Series 3520V pumps are of Sperry Vickers "balanced vane type" construction. Usable with all fluids listed.

Filtration (Mandatory)..... 25 Micron or Less

## Drive Data

### Shaft Rotation

Pumps are normally assembled for right hand or clockwise rotation as viewed from the shaft end. If left hand or counterclockwise rotation is required, specify by adding the symbol "L" to the model number.

Example: 3520V25A11-1CC10L-180

Inlet and outlet ports remain the same regardless of direction of shaft rotation. Change of assembly of internal parts is necessary when change of shaft rotation is required.

## Pump Drive

Pump is recommended for direct coaxial drive. If drives imposing radial shaft loads are considered, consult your Sperry Vickers sales representative.

Minimum Recommended Drive Speed..... 600 RPM

Maximum Speed Ratings and Inlet Vacuum are tabulated for three types of fluid. These are influenced by specific gravity, viscosity and suction head. Pump suction and speed should be related so that vacuum at pump inlet does not exceed 5" of mercury for petroleum oil and water glycol; 3" for synthetic fluids.

## Ratings

### Maximum Speed (RPM)

Petroleum Oil..... 1800  
Synthetic and Water Glycol..... 1200

### Maximum Pressure (PSI)

Petroleum Oil..... (2 & 14 Ring Sizes - Cover End)..... 2000  
(12 Ring Size - Cover End)..... 2300  
(5, 8 & 11 Ring Sizes - Cover End)..... 3000  
(25, 30, 35 & 38 Ring Sizes - Shaft End)..... 2500  
(14 Ring Size - Cover End)..... 1800  
(2, 5, 8, 11 & 12 Ring Sizes - Cover End)..... 2000  
(25, 30, 35 & 38 Ring Sizes - Shaft End)..... 2000  
(14 Ring Size - Cover End)..... 1800  
(2, 5, 8, 11 & 12 Ring Sizes - Cover End)..... 2000  
(25, 30, 35 & 38 Ring Sizes - Shaft End)..... 2000

## Special Information

Note: Do not run a pump with the outlet pressure lower than the inlet pressure. This causes operating noise and vane instability.

The no. 86 shaft is recommended for most applications and always when shaft torque exceeds no. 1 shaft rating.

## Air Bleed

At time of first starting, if the pump does not immediately prime, air should be bled from pump delivery line. This may be accomplished by loosening a connection in the delivery line close to the pump until oil flows, indicating pump has primed. An airbleed valve is available for this purpose. See drawing 521601.

## Caution:

There is no case drain connection. The pump is drained internally into its inlet. Pressure at the pump inlet connection may not exceed 20 PSI.

## Fluids and Temperature Data

Petroleum Oils - Use antiwear industrial hydraulic oils or automotive crankcase oils having letter designations SC, SD or SE.

Running viscosity range 70 to 250 SUS. Operating temperature 120°F. recommended, 150°F. usual maximum.

For details, refer to hydraulic fluid and temperature recommendations for industrial machinery, data sheet 1-286-S in catalogue.

Water Glycols - Select fluids with an operating viscosity of the petroleum oil described above. Recommended maximum temperature 130°F.

Note: Water-in-oil (inwert) emulsions, and 5% solution of oil-in-water are not recommended. Synthetic Fire Resistant Fluids - Phosphate esters and their blends with operating viscosity of the petroleum oil described above. These fluids are generally compatible with fluorocarbon and silicone elastomers. Add F3 prefix to the model number.

## Ordering Instructions

Select pumps according to the typical model code shown. Available standard options are listed in this code.

## Electric Motor Pumps

Many motor manufacturers are prepared to furnish drip proof or totally enclosed motors with end bells on which this pump can be mounted.

Sound Data (With 38 & 14 GPM Rings)

Sound level is 71 db(A) at 1200 RPM and 2000 PSI using SAE 10W oil at 120°F, 5" Hg inlet. Tested per ISO-draft international standard 4412.

Weight Lbs. (Approx.)

3520V.....10-180 (Std. 2-Bolt Mounting)..... 75  
3520V.....10-181 (Foot Mounting)..... 88

## Typical Model Code

F3 - 3520 V 25 A 11 - 1 CC 10 L - \*\*\*

Special Seals  
Omit If Not Re-  
quired. See Fluids  
Note

Series Designation

Vane Pump

Capacity - Shaft End Pump  
(SAE Rating 1200 RPM -  
100 PSI)  
25 - 25 GPM 35 - 35 GPM  
30 - 30 GPM 38 - 38 GPM

Port Connections

Inlet Outlet  
No. 1 No. 2  
SAE SAE  
4-Bolt 4-Bolt  
Flg. Flg.  
A E  
SAE SAE  
4-Bolt 4-Bolt  
Flg. Flg.  
E Thd.

Capacity - Cover End Pump  
(SAE Rating 1200 RPM - 100 PSI)  
2 - 2 GPM 11 - 11 GPM  
5 - 5 GPM 12 - 12 GPM  
8 - 8 GPM 14 - 14 GPM

Shaft Type  
1 - Straight Keyed (Standard)  
86 - Straight Keyed (Heavy Duty)

Special Features Suffix  
180 - Flange Mounting  
181 - Foot Mounting  
Foot Kit - FB-C-10

Rotation (Viewed From Shaft End)  
L - Left Hand  
(Right Hand Rotation Need Not Be  
Specified In Model)

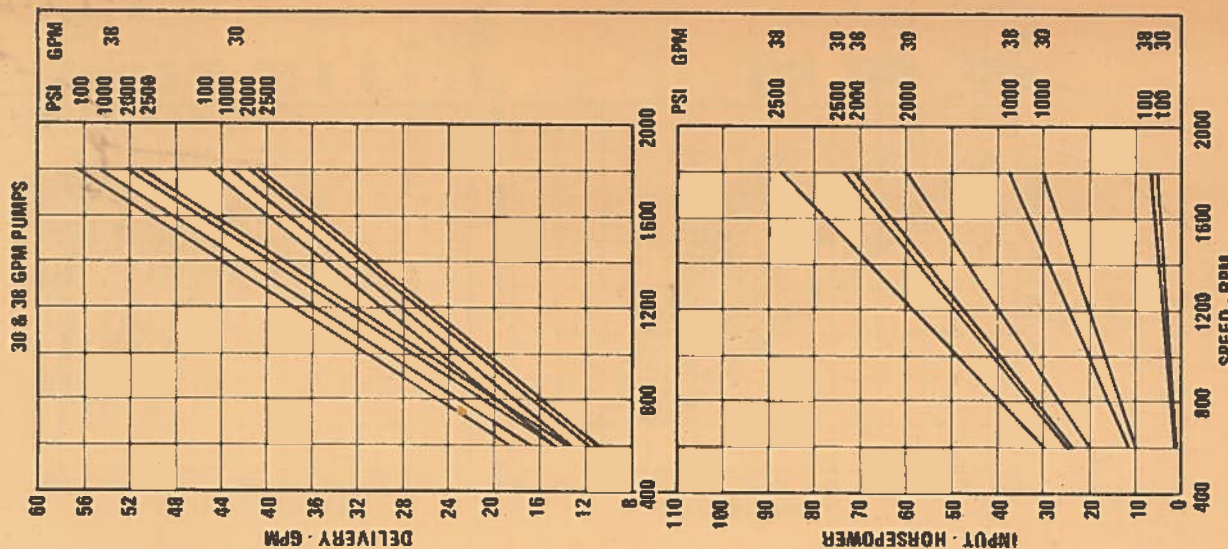
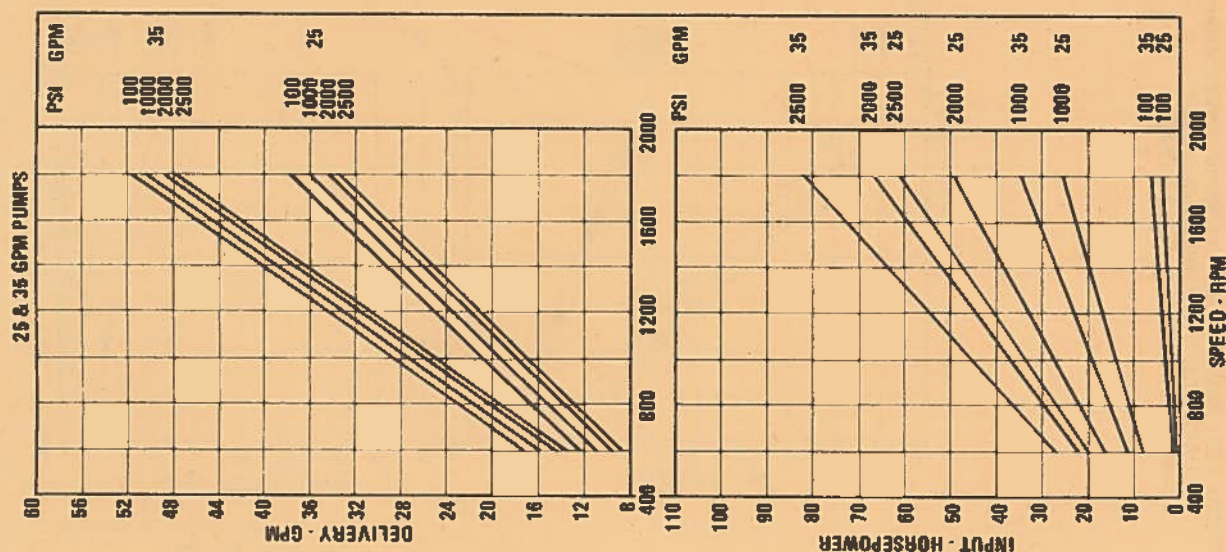
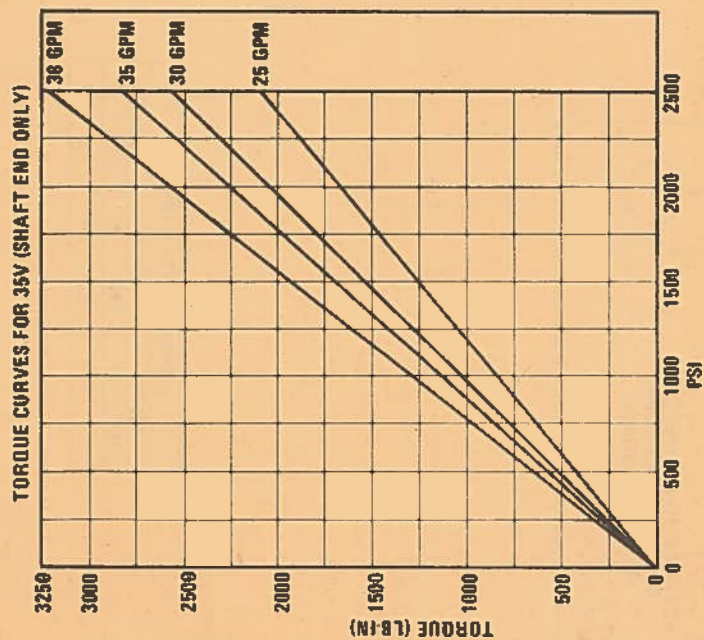
Design Number  
Design Numbers Subject To Change.  
Installation Dimensions Remain The  
Same For Design Numbers 10 Thru 19.

Outlet Positions (Viewed From Cover End)  
(With Outlet No. 1 Opposite Inlet)  
AA No. 2 Outlet 135° CCW From Inlet  
AB No. 2 Outlet 45° CCW From Inlet  
AC No. 2 Outlet 45° CW From Inlet  
AD No. 2 Outlet 135° CW From Inlet  
(With No. 1 Outlet 90° CCW From Inlet)  
BA No. 2 Outlet 135° CCW From Inlet  
BB No. 2 Outlet 45° CCW From Inlet  
BC No. 2 Outlet 45° CW From Inlet  
BD No. 2 Outlet 135° CW From Inlet  
(With No. 1 Outlet Inline With Inlet)  
CA No. 2 Outlet 135° CCW From Inlet  
CB No. 2 Outlet 45° CCW From Inlet  
CC No. 2 Outlet 45° CW From Inlet  
CD No. 2 Outlet 135° CW From Inlet  
(With No. 1 Outlet 90° CW From Inlet)  
DA No. 2 Outlet 135° CCW From Inlet  
DB No. 2 Outlet 45° CCW From Inlet  
DC No. 2 Outlet 45° CW From Inlet  
DD No. 2 Outlet 135° CW From Inlet

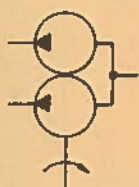


**TYPICAL PERFORMANCE CURVES 3520V (SHAFT END)**  
DATA BASED ON OPERATION WITH  
SAE 10W ANTI-WEAR OIL AT 120°F.

● Note: Maximum allowable torque on the no. 1 shaft 3600 lb. in., above 3600 lb. in. torque (5300 lb. in. maximum) the no. 86 shaft must be used. Check torque from each pump cartridge and add, if both pumps are under pressure at the same time.





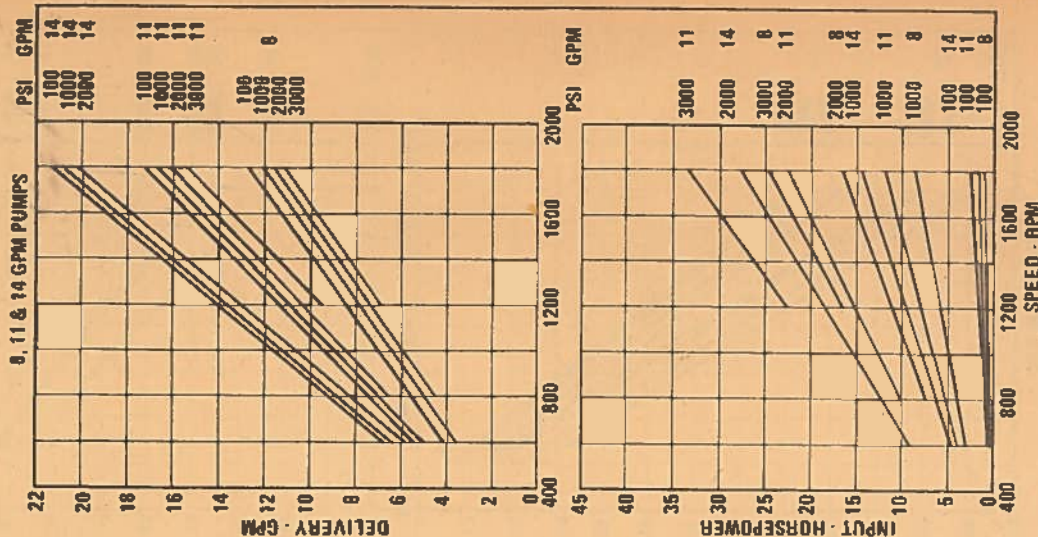
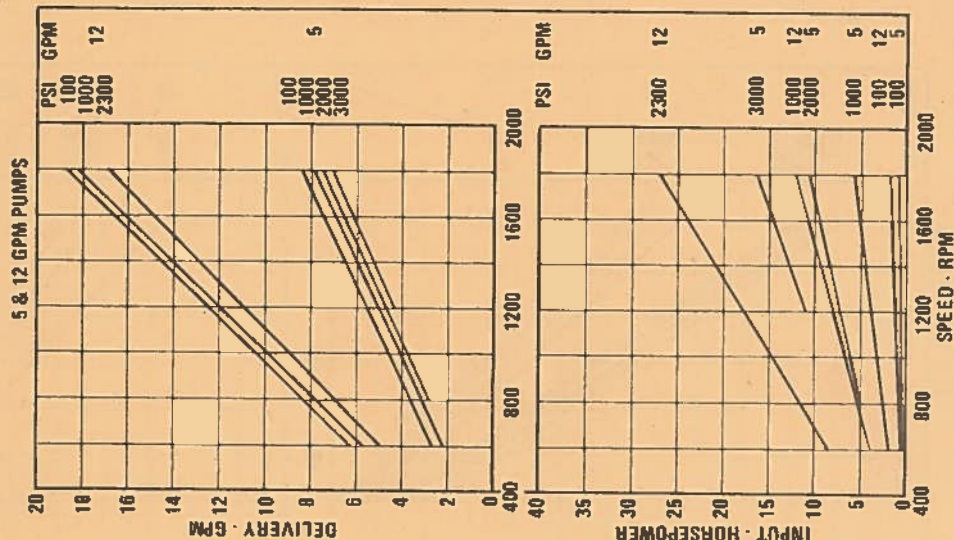
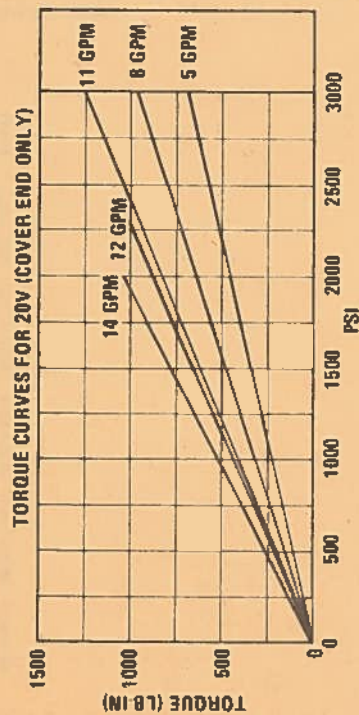


STANDARD GRAPHICAL  
SYMBOL FOR FLUID  
POWER DIAGRAM

TYPICAL PERFORMANCE CURVES 3520V (COVER END)  
DATA BASED ON OPERATION WITH  
SAE 10W ANTI-WEAR OIL AT 120°F.

2 GPM RING SIZE - 1800 RPM					
100 PSI	1000 PSI	1000 PSI	2000 PSI	2000 PSI	
GPM	HP	GPM	HP	GPM	HP
3.7	.54	3.3	3.54	2.9	6

● Note: Maximum allowable torque on the no. 1 shaft  
3600 lb. in., above 3600 lb. in. torque (5300 lb. in. maximum)  
the no. 86 shaft must be used. Check torque from each pump  
cartridge and add, if both pumps are under pressure at the  
same time.





**S**PERRY  **VICKERS**  
TROY, MICHIGAN 48064

**PUMPS  
DOUBLE**

### FIXED DISPLACEMENT

VANE  
TYPE

COVER END 12-21 GPM  
SHAFT END 25-45 GPM

**2-BOLT FLANGE  
OR FOOT MOUNTING**

DWG. NO.  
504500

Series 3525V pumps are of Sperry Vickers "balanced vane type" construction. Usable with all fluids listed.

### **Ratings:**

Maximum Speed (RPM)	
Petroleum Oil	1800
Synthetic, Water Glycol and Water-in-oil Emulsion	1200
Maximum Pressure (PSI)	
Petroleum Oil	2500
Synthetic and Water Glycol	2000
Water-in-oil Emulsion	1000

SAE 4-Bolt Connection Pads Are For Use With SAE 4-Bolt Flanges. See Drawing 1-250700 For Selection.

SAE Straight Thread Connections Are  
For Use With SAE Hydraulic Fittings  
And "O" Ring Seals.

**4-Bolt SAE Flange Connections Will Also Accommodate User's 2-Bolt Flanges Of The Proper Design.**

Optional Str. Thd.


Connection 1.3125-12 UN-2B  
Thd. For SAE Hyd. Fittings

Thd. For SAE Hyd. Fittings

10

 $1.031 \pm .008$ 

५.



3310

2.31 R.

50 R.

0400

2.408

2 Holes

2.030

4.060

2.408

— 4.816 —

A

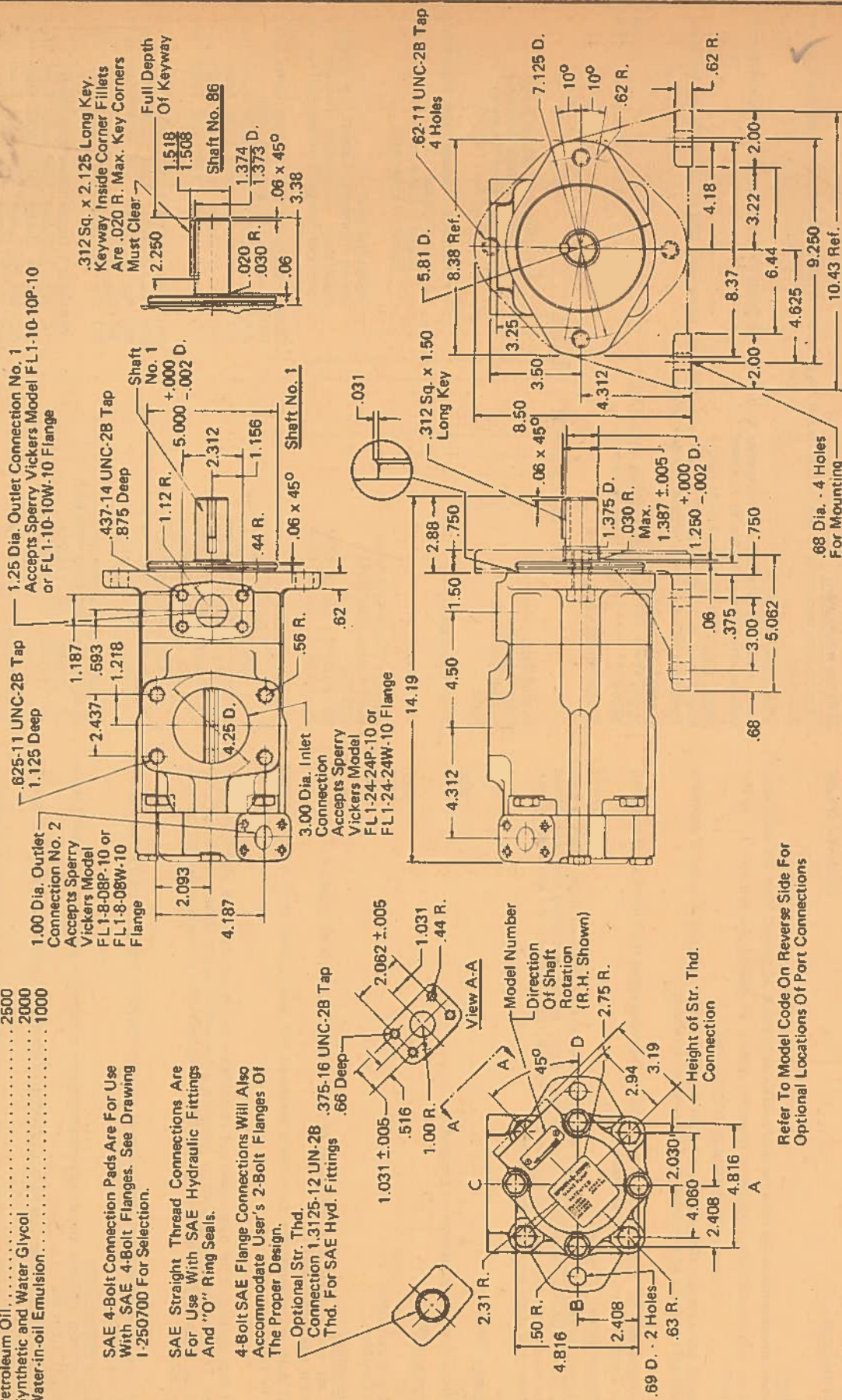
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Op.

011-1-78

REVISÉ 11-1-78

**Refer To Model Code On Reverse Side For  
Optional Locations Of Port Connections**



**MODEL 3525V\*\*A\*\*-1CC10-18\***  
**(STANDARD 2-BOLT FLANGE OR FOOT MOUNTING)**

504500

SEC  
b



## General Data

Series 3525V pumps are of Sperry Vickers "balanced vane type" construction. Usable with all fluids listed.

Filtration (Mandatory)..... 25 Micron or Less

## Drive Data

### Shaft Rotation

Pumps are normally assembled for right hand or clockwise rotation as viewed from the shaft end. If left hand or counterclockwise rotation is required, specify by adding the symbol "L" to the model number.

Example: 3525V38A21-1CC10L-180

Inlet and outlet ports remain the same regardless of direction of shaft rotation. Change of assembly of internal parts is necessary when change of shaft rotation is required.

## Pump Drive

Pump is recommended for direct coaxial drive. If drives imposing radial shaft loads are considered, consult your Sperry Vickers sales representative.

Minimum Recommended Drive Speed..... 600 RPM

Maximum Speed Ratings and Inlet Vacuum are tabulated for four types of fluid. These are influenced by specific gravity, viscosity and suction head. Pump suction and speed should be related so that vacuum at pump inlet does not exceed 5" of mercury for petroleum oil and water glycol; 3" for synthetic and water-in-oil emulsion fluids.

## Ratings

### Maximum Speed (RPM)

Petroleum Oil..... 1800  
Synthetic, Water Glycol and Water-in-oil Emulsion..... 1200

### Maximum Pressure (PSI)

Petroleum Oil..... 2500  
Synthetic and Water Glycol..... 2000  
Water-in-oil Emulsion..... 1000

## Special Information

Note: Do not run a pump with the outlet pressure lower than the inlet pressure. This causes operating noise and vane instability.

The no. 86 shaft is recommended for most applications and always when shaft torque exceeds no. 1 shaft rating.

## Air Bleed

At time of first starting, if the pump does not immediately prime, air should be bled from pump delivery line. This may be accomplished by loosening a connection in the delivery line close to the pump until oil flows, indicating pump has primed. An airbleed valve is available for this purpose. See drawing 521601.

## Caution:

There is no case drain connection. The pump is drained internally into its inlet. Pressure at the pump inlet connection may not exceed 20 PSI.

## Fluids and Temperature Data

Petroleum Oils - Use antiwear industrial hydraulic oils or automotive crankcase oils having letter designations SC, SD or SE.

Running viscosity range 70 to 250 SUS. Operating temperature 120°F. recommended, 150°F. usual maximum.

For details, refer to hydraulic fluid and temperature recommendations for industrial machinery, data sheet 1-286-S in catalogue.

Water Glycols - Select fluids with an operating viscosity of the petroleum oil described above. Recommended maximum temperature 130°F.

Water-in-oil Emulsion may be used however, they require careful selection and monitoring of the fluid. For assistance contact Sperry Vickers representative. Soluble-oil-in-water solutions not recommended.

Synthetic Fire Resistant Fluids - Phosphate esters and their blends with operating viscosity of the petroleum oil described above. These fluids are generally compatible with fluorocarbon and silicone elastomers. Add F3 prefix to the model number.

## Ordering Instructions

Select pumps according to the typical model code shown. Available standard options are listed in this code.

## Electric Motor Pumps

Many motor manufacturers are prepared to furnish drip proof or totally enclosed motors with end bells on which this pump can be mounted.

Sound Data (With 38 and 21 GPM Rings)

Sound level is 71 db(A) at 1200 RPM and 2000 PSI using SAE 10W oil at 120°F. 5" Hg inlet. Tested per ISO-draft international standard 4412.

## Weight Lbs. (Approx.)

3525V.....10-180 (Std. 2-Bolt Mounting)..... 76  
3525V.....10-181 (Foot Mounting)..... 89

## Typical Model Code

F3 - 3525 V 38 A 21 - 1 CC 10 L - \*\*\*  
Special Seals  
Omit if Not Re-  
quired. See Fluids  
Note  
Series Designation  
Vane Pump  
Capacity - Shaft End Pump  
(SAE Rating 1200 RPM -  
100 PSI)  
25 - 25 GPM 35 - 35 GPM  
30 - 30 GPM 38 - 38 GPM  
Port Connections  
Inlet Outlet  
No. 1 No. 2  
SAE SAE  
4-Bolt 4-Bolt  
Flg. Flg.  
A E  
SAE SAE  
4-Bolt 4-Bolt  
Flg. Flg.  
Str.  
Thd.  
Capacity - Cover End Pump  
(SAE Rating 1200 RPM - 100 PSI)  
12 - 12 GPM 17 - 17 GPM  
14 - 14 GPM 21 - 21 GPM  
● Shaft Type  
1 - Straight Keyed Standard  
86 - Straight Keyed (Heavy Duty)

Special Features Suffix  
180 - Flange Mounting  
181 - Foot Mounting  
Foot Kit - FB-C-10  
Rotation (Viewed From Shaft End)  
L - Left Hand  
(Right Hand Rotation Need Not Be  
Specified In Model)

Design Number  
Design Numbers Subject To Change.  
Installation Dimensions Remain The  
Same For Design Numbers 10 Thru 19.

Outlet Positions (Viewed From Cover End)  
(With Outlet No. 1 Opposite Inlet)

Outlet No.	Outlet	From
AA	No. 2	Outlet 135° CCW
AB	No. 2	Outlet 45° CCW
AC	No. 2	Outlet 45° CW
AD	No. 2	Outlet 135° CW
(With No. 1 Outlet 90° CCW From Inlet)		
BA	No. 2	Outlet 135° CCW
BB	No. 2	Outlet 45° CCW
BC	No. 2	Outlet 45° CW
BD	No. 2	Outlet 135° CW

(With No. 1 Outlet Inline With Inlet)

Outlet No.	Outlet	From
CA	No. 2	Outlet 135° CCW
CB	No. 2	Outlet 45° CCW
CC	No. 2	Outlet 45° CW
CD	No. 2	Outlet 135° CW

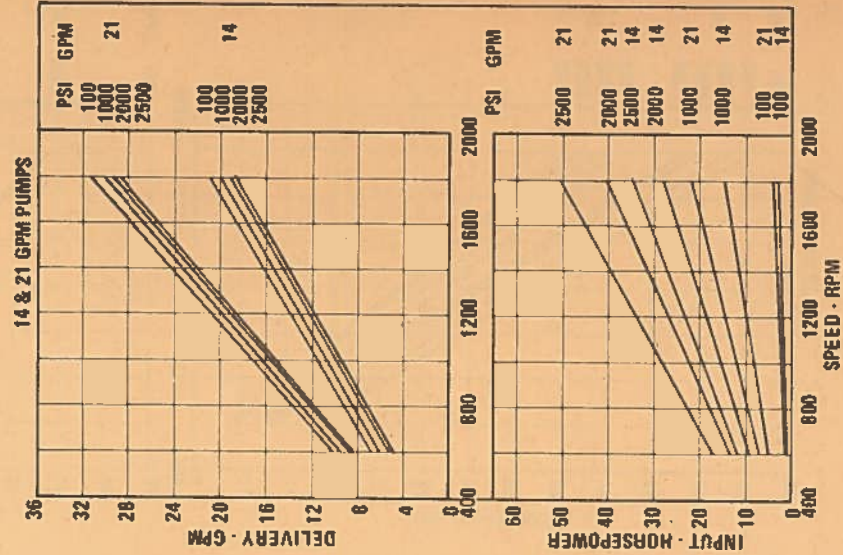
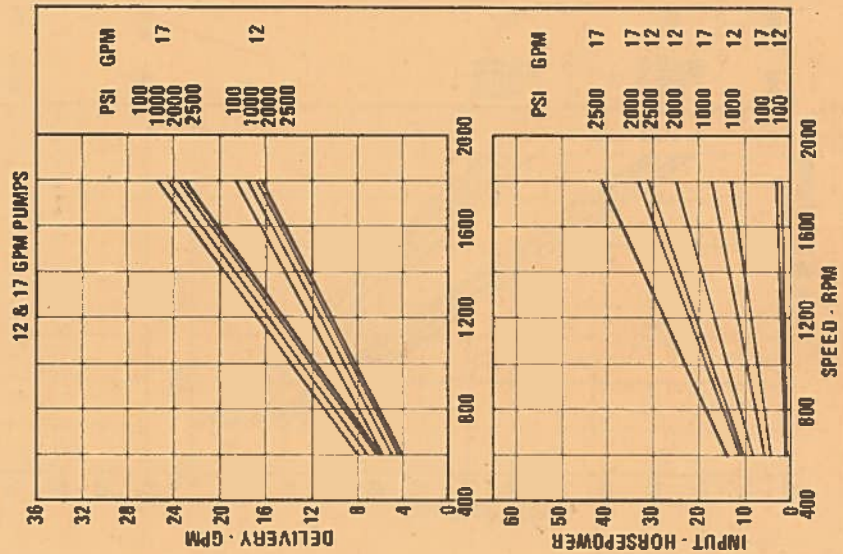
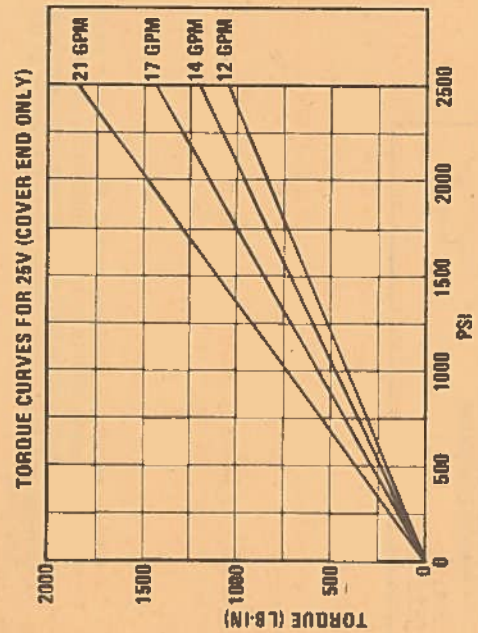
(With No. 1 Outlet 90° CW From Inlet)

Outlet No.	Outlet	From
DA	No. 2	Outlet 135° CCW
DB	No. 2	Outlet 45° CCW
DC	No. 2	Outlet 45° CW
DD	No. 2	Outlet 135° CW

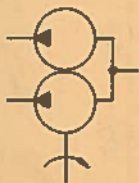


TYPICAL PERFORMANCE CURVES 3525V (COVER END)  
DATA BASED ON OPERATION WITH  
SAE 10W ANTI-WEAR OIL AT 120°F.

● Note: Maximum allowable torque on the no. 1 shaft 3600 lb. in., above 3600 lb. in. torque (5300 lb. in. maximum) the no. 86 shaft must be used. Check torque from each pump cartridge and add, if both pumps are under pressure at the same time.

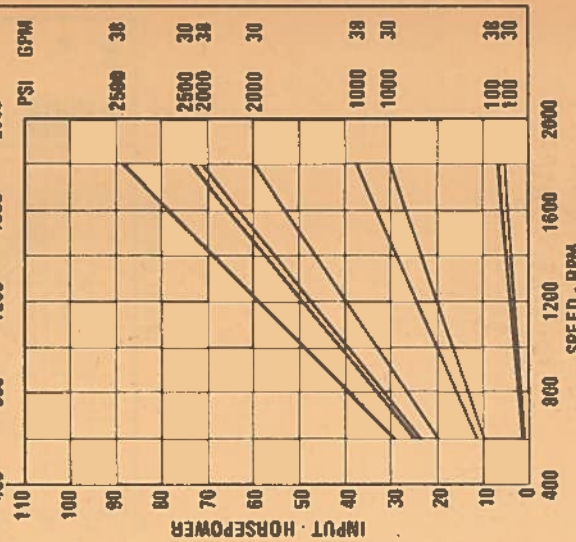
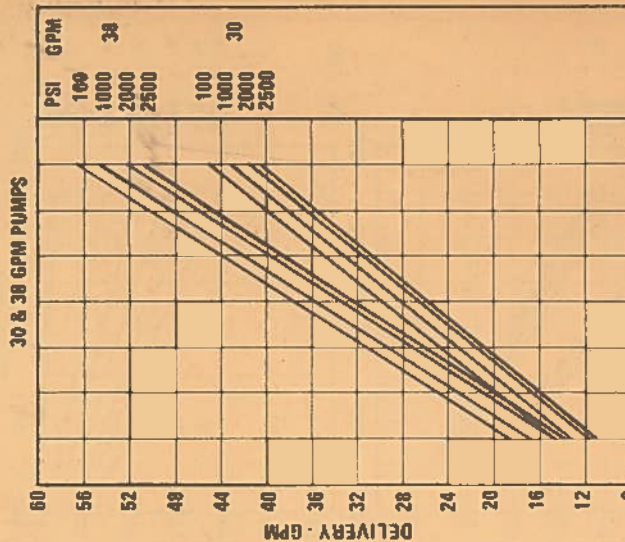
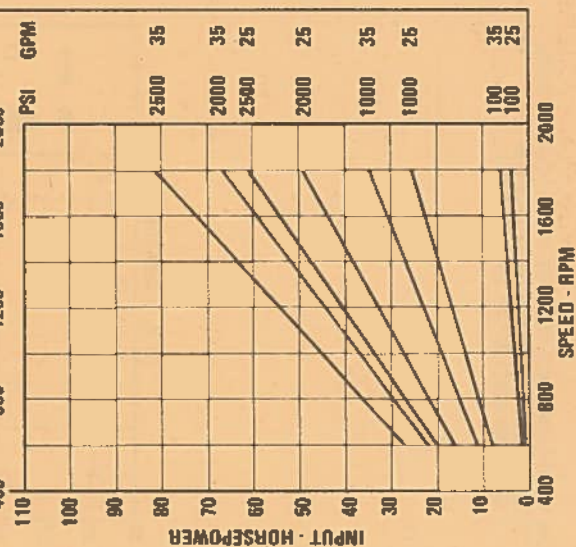
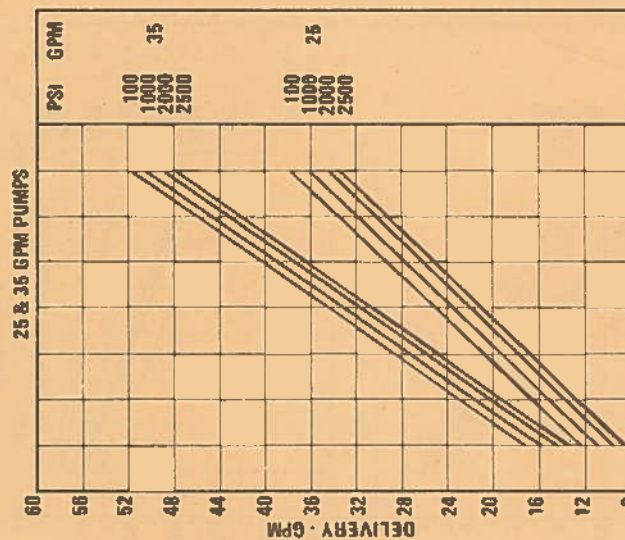




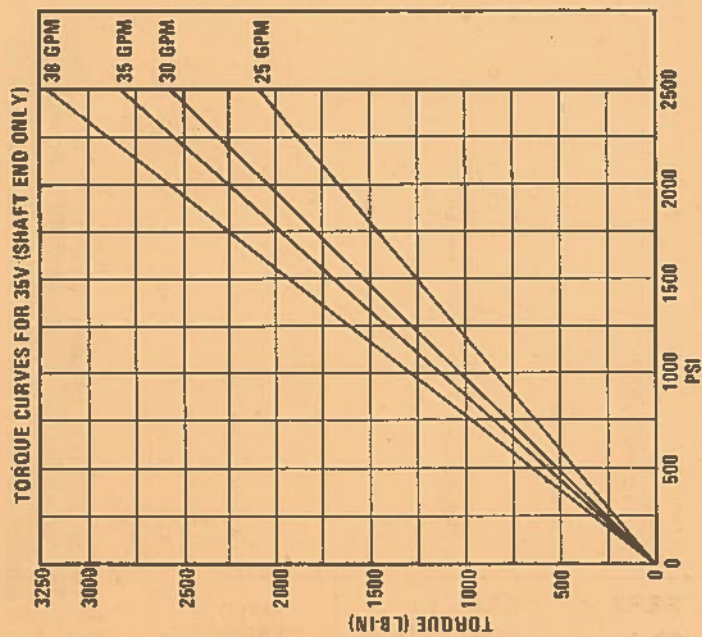


STANDARD GRAPHICAL  
SYMBOL FOR FLUID  
POWER DIAGRAM

TYPICAL PERFORMANCE CURVES 3525V (SHAFT END)  
DATA BASED ON OPERATION WITH  
SAE 10W ANTI-WEAR OIL AT 120°F.



● Note: Maximum allowable torque on the no. 1 shaft 3600 lb. in., above 3600 lb. in. torque (5300 lb. in. maximum) the no. 86 shaft must be used. Check torque from each pump cartridge and add, if both pumps are under pressure at the same time.









**General Data**  
 Series 4520V pumps are of Sperry Vickers "balanced vane type" construction. Usable with all fluids listed.  
**Filtration (Mandatory)**..... 25 Micron or Less  
**Drive Data**  
**Shaft Rotation**  
 Pumps are normally assembled for right hand or clockwise rotation as viewed from the shaft end. If left hand or counterclockwise rotation is required, specify by adding the symbol "L" to the model number.  
 Example: 4520V60A11-1CC10L-180  
 Inlet and outlet ports remain the same regardless of direction of shaft rotation. Change of assembly of internal parts is necessary when change of shaft rotation is required.  
**Pump Drive**  
 Pump is recommended for direct coaxial drive. If drives imposing radial shaft loads are considered, consult your Sperry Vickers sales representative.  
**Minimum Recommended Drive Speed**..... 600 RPM  
**Maximum Speed Ratings and Inlet Vacuum** are tabulated for four types of fluid. These are influenced by specific gravity, viscosity and suction head. Pump suction and speed should be related so that vacuum at pump inlet does not exceed 5" of mercury for petroleum oil and water glycol; 3" for synthetic fluids.

Ratings	
Maximum Speed (RPM)	
Petroleum Oil.....	*1800
Synthetic and Water Glycol.....	1200
Maximum Pressure (PSI)	
Petroleum Oil.....	(2 & 14 Ring Sizes - Cover End)..... 2000
	(12 Ring Size - Cover End)..... 2300
	(5, 8 & 11 Ring Sizes - Cover End)..... 3000
	(42, 50 & 60 Ring Sizes - Shaft End)..... *2500
Synthetic.....	(14 Ring Size - Cover End)..... 1800
	(2, 5, 8, 11 & 12 Ring Sizes - Cover End)..... 2000
	(42, 50 & 60 Ring Sizes - Shaft End)..... 2000
Water Glycol.....	(14 Ring Size - Cover End)..... 1800
	(2, 5, 8, 11 & 12 Ring Sizes - Cover End)..... 2000
	(42, 50 & 60 Ring Sizes - Shaft End)..... 2000

\* 42, 50 & 60 Ring Sizes { 1200 RPM at 2500 PSI  
 1800 RPM at 2200 PSI  
**Special Information**  
 Note: Do not run a pump with the outlet pressure lower than the inlet pressure. This causes operating noise and vane instability.  
 The no. 86 shaft is recommended for most applications and always when shaft torque exceeds no. 1 shaft rating.  
**Air Bleed**  
 At time of first starting, if the pump does not immediately prime, air should be bled from pump delivery line. This may be accomplished by loosening a connection in the delivery line close to the pump until oil flows, indicating pump has primed. An airbleed valve is available for this purpose. See drawing 521601.  
**Caution:**  
 There is no case drain connection. The pump is drained internally into its inlet. Pressure at the pump inlet connection may not exceed 20 PSI.  
**Fluids and Temperature Data**  
 Petroleum Oils - Use antiwear industrial hydraulic oils or automotive crankcase oils having letter designations SC, SD or SE.  
 Running viscosity range 70 to 250 SUS. Operating temperature 120°F. recommended, 150°F. usual maximum.  
 For details, refer to hydraulic fluid and temperature recommendations for industrial machinery, data sheet I-286-S in catalogue.

**Water Glycols** - Select fluids with an operating viscosity of the petroleum oil described above. Recommended maximum temperature 130°F.

Note: Water-in-oil (invert) emulsions, and 5% solution of oil-in-water are not recommended.

**Synthetic Fire Resistant Fluids** - Phosphate esters and their blends with operating viscosity of the petroleum oil described above. These fluids are generally compatible with fluorocarbon and silicone elastomers. Add F3 prefix to the model number.

**Ordering Instructions**  
 Select pumps according to the typical model code shown. Available standard options are listed in this code.

**Electric Motor Pumps**  
 Many motor manufacturers are prepared to furnish drip proof or totally enclosed motors with end bells on which this pump can be mounted.

Sound Data (With 60 and 14 GPM Rings)

Sound level is 72 db(A) at 1200 RPM and 2000 PSI using SAE 10W oil at 120°F. 5" Hg inlet. Tested per ISO-draft international standard 4412.

Weight Lbs. (Approx.) 4520V..... 94  
 4520V..... 107

**Typical Model Code** F3 - 4520 V 60 A 11 - 1 CC 10 L - \*\*\*

Special Seals  
 Omit If Not Re-  
 quired. See Fluids  
 Note

Series Designation  
 Vane Pump

Capacity - Shaft End Pump  
 (SAE Rating 1200 RPM -  
 100 PSI)  
 42 - 42 GPM 60 - 60 GPM  
 50 - 50 GPM

Port Connections

Inlet	Outlet No. 1	Outlet No. 2
SAE 4-Bolt Flg.	SAE 4-Bolt Flg.	SAE 4-Bolt Flg.
SAE 4-Bolt Flg.	SAE 4-Bolt Flg.	SAE 4-Bolt Flg.
SAE 4-Bolt Flg.	SAE 4-Bolt Flg.	SAE 4-Bolt Flg.

Capacity - Cover End Pump  
 (SAE Rating 1200 RPM - 100 PSI)  
 2 - 2 GPM 11 - 11 GPM  
 5 - 5 GPM 12 - 12 GPM  
 8 - 8 GPM 14 - 14 GPM

● Shaft Type  
 1 - Straight Keyed Standard  
 86 - Straight Keyed (Heavy Duty)

Special Features Suffix  
 180 - Flange Mounting  
 181 - Foot Mounting  
 Foot Kit - FB C-10

Rotation (Viewed From Shaft End)  
 L - Left Hand  
 (Right Hand Rotation Need Not Be Specified In Model)

Design Number  
 Design Numbers Subject To Change.  
 Installation Dimensions Remain The Same For Design Numbers 10 Thru 19.

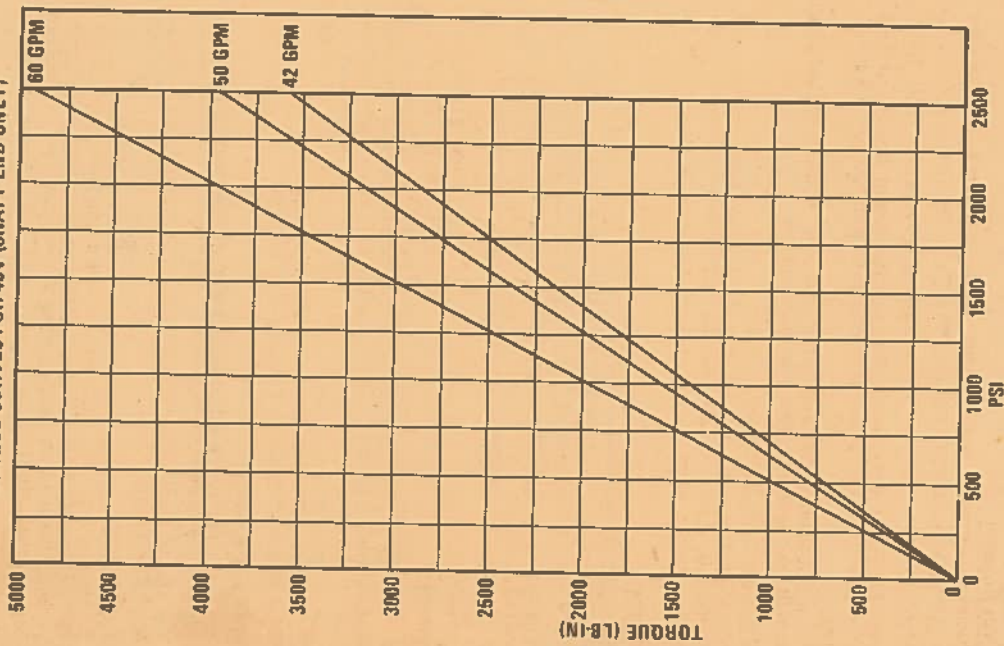
Outlet Positions (Viewed From Cover End)  
 (With Outlet No. 1 Opposite Inlet)  
 AA No. 2 Outlet 135° CCW From Inlet  
 AB No. 2 Outlet 45° CCW From Inlet  
 AC No. 2 Outlet 45° CW From Inlet  
 AD No. 2 Outlet 135° CW From Inlet  
 (With No. 1 Outlet 90° CCW From Inlet)  
 BA No. 2 Outlet 135° CCW From Inlet  
 BB No. 2 Outlet 45° CCW From Inlet  
 BC No. 2 Outlet 45° CW From Inlet  
 BD No. 2 Outlet 135° CW From Inlet  
 (With No. 1 Outlet Inline With Inlet)  
 CA No. 2 Outlet 135° CCW From Inlet  
 CB No. 2 Outlet 45° CCW From Inlet  
 CC No. 2 Outlet 45° CW From Inlet  
 CD No. 2 Outlet 135° CW From Inlet  
 (With No. 1 Outlet 90° CW From Inlet)  
 DA No. 2 Outlet 135° CCW From Inlet  
 DB No. 2 Outlet 45° CCW From Inlet  
 DC No. 2 Outlet 45° CW From Inlet  
 DD No. 2 Outlet 135° CW From Inlet

504600-1

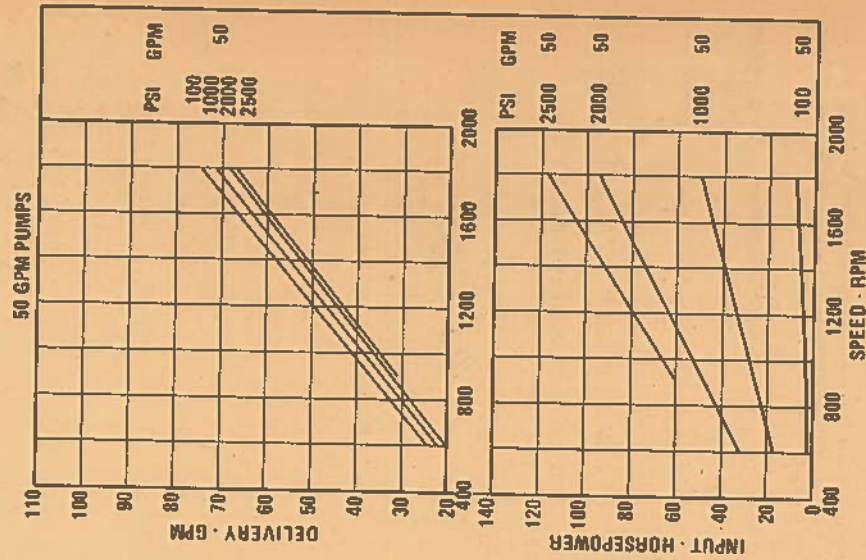
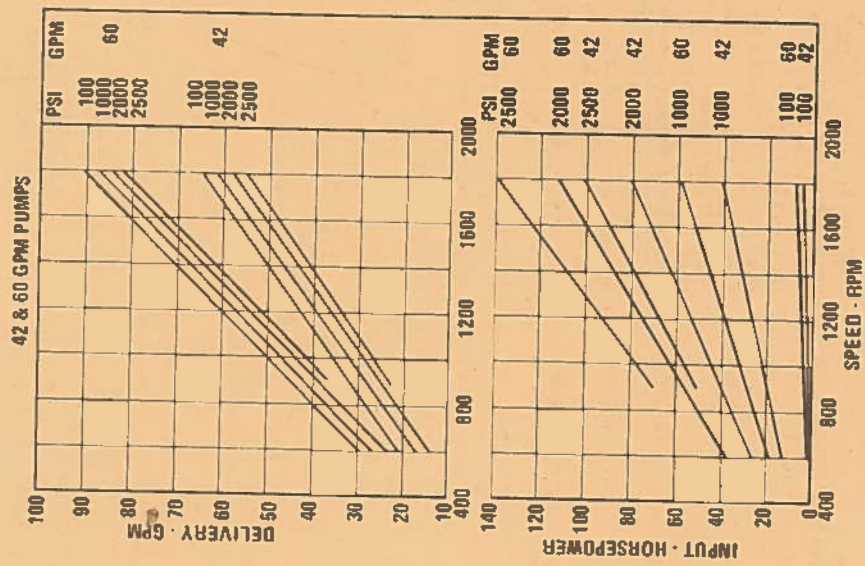


● Note: Maximum allowable torque on the no. 1 shaft 5600 lb. in., above 5600 lb. in. torque (7200 lb. in. maximum) the no. 86 shaft must be used. Check torque from each pump cartridge and add, if both pumps are under pressure at the same time.

TORQUE CURVES FOR 45V (SHAFT END ONLY)



TYPICAL PERFORMANCE CURVES 4520V (SHAFT END)  
DATA BASED ON OPERATION WITH  
SAE 10W ANTI-WEAR OIL AT 120°F.





General Data

Series 4525V pumps are of Sperry Vickers "balanced vane type" construction. Usable with all fluids listed.

Filtration (Mandatory) ..... 25 Micron or Less

Drive Data

Shaft Rotation

Pumps are normally assembled for right hand or clockwise rotation as viewed from the shaft end. If left hand or counterclockwise rotation is required, specify by adding the symbol "L" to the model number.

Example: 4525V60A21-1CC10L-180

Inlet and outlet ports remain the same regardless of direction of shaft rotation. Change of assembly of internal parts is necessary when change of shaft rotation is required.

Pump Drive

Pump is recommended for direct coaxial drive. If drives imposing radial shaft loads are considered, consult your Sperry Vickers sales representative.

Minimum Recommended Drive Speed ..... 600 RPM

Maximum Speed Ratings and Inlet Vacuum are tabulated for four types of fluid. These are influenced by specific gravity, viscosity and suction head. Pump suction and speed should be related so that vacuum at pump inlet does not exceed 5" of mercury for petroleum oil and water glycol; 3" for synthetic and water-in-oil emulsion fluids.

Ratings

Maximum Speed (RPM)

Petroleum Oil ..... \*1800  
Synthetic, Water Glycol and Water-in-oil Emulsion ..... 1200

Maximum Pressure (PSI)

Petroleum Oil ..... (12, 14, 17 & 21 Ring Sizes) \*42, 50 & 60 Ring Sizes  
..... 2500  
..... 1200 RPM at 2500  
..... 1800 RPM at 2000  
..... 2000  
..... 1000

Synthetic and Water Glycol

Water-in-oil Emulsion

..... 2500  
..... 1200 RPM at 2500  
..... 1800 RPM at 2000  
..... 2000  
..... 1000

Special Information

Note: Do not run a pump with the outlet pressure lower than the inlet pressure. This causes operating noise and vane instability.

The no. 86 shaft is recommended for most applications and always when shaft torque exceeds no. 1 shaft rating.

Air Bleed

At time of first starting, if the pump does not immediately prime, air should be bled from pump delivery line. This may be accomplished by loosening a connection in the delivery line close to the pump until oil flows, indicating pump has primed. An airbleed valve is available for this purpose. See drawing 521601.

Caution:

There is no case drain connection. The pump is drained internally into its inlet. Pressure at the pump inlet connection may not exceed 20 PSI.

Fluids and Temperature Data

Petroleum Oils - Use antiwear industrial hydraulic oils or automotive crankcase oils having letter designations SC, SD or SE.

Running viscosity range 70 to 250 SUS. Operating temperature 120°F. recommended, 150°F. usual maximum.

For details, refer to hydraulic fluid and temperature recommendations for industrial machinery, data sheet I-286-S in catalogue.

Water Glycols - Select fluids with an operating viscosity of the petroleum oil described above. Recommended maximum temperature 130°F.

Water-in-oil Emulsion may be used however, they require careful selection and monitoring of the fluid. For assistance contact Sperry Vickers representative. Soluble-oil-in-water solutions not recommended.

Synthetic Fire Resistant Fluids - Phosphate esters and their blends with operating viscosity of the petroleum oil described above. These fluids are generally compatible with fluorocarbon and silicone elastomers. Add F3 prefix to the model number.

Ordering Instructions

Select pumps according to the typical model code shown. Available standard options are listed in this code.

Electric Motor Pumps

Many motor manufacturers are prepared to furnish drip proof or totally enclosed motors with end bells on which this pump can be mounted.

Sound Data (With 60 and 21 GPM Rings)

Sound level is 72 db(A) at 1200 RPM and 2000 PSI using SAE 10W oil at 120°F. 5" Hg inlet. Tested per ISO-draft international standard 4412.

Weight Lbs. (Approx.) 4525V ..... \*10-180 (Std. 2-Bolt Mounting) ..... 89  
4525V ..... \*10-181 (Foot Mounting) ..... 102

Typical Model Code

F3 - 4525 V 60 A 21 - 1 CC 10 L - \*\*\*

Special Seals

Omit if Not Required. See Fluids Note

Series Designation

Vane Pump

Capacity - Shaft End Pump

(SAE Rating 1200 RPM - 100 PSI)

42 - 42 GPM 60 - 60 GPM

50 - 50 GPM

Port Connections

Inlet Outlet No. 1 No. 2

SAE SAE SAE

4-Bolt 4-Bolt 4-Bolt

Fig. Fig. Fig.

SAE SAE SAE

4-Bolt 4-Bolt 4-Bolt

Fig. Fig. Fig.

SAE SAE SAE

4-Bolt 4-Bolt 4-Bolt

Fig. Fig. Fig.

SAE SAE SAE

4-Bolt 4-Bolt 4-Bolt

Fig. Fig. Fig.

SAE SAE SAE

4-Bolt 4-Bolt 4-Bolt

Fig. Fig. Fig.

SAE SAE SAE

4-Bolt 4-Bolt 4-Bolt

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SAE SAE SAE

4-Bolt 4-Bolt 4-Bolt

Fig. Fig. Fig.

SAE SAE SAE

4-Bolt 4-Bolt 4-Bolt

Fig. Fig. Fig.

SAE SAE SAE

4-Bolt 4-Bolt 4-Bolt

Fig. Fig. Fig.

SAE SAE SAE

4-Bolt 4-Bolt 4-Bolt

Fig. Fig. Fig.

SAE SAE SAE

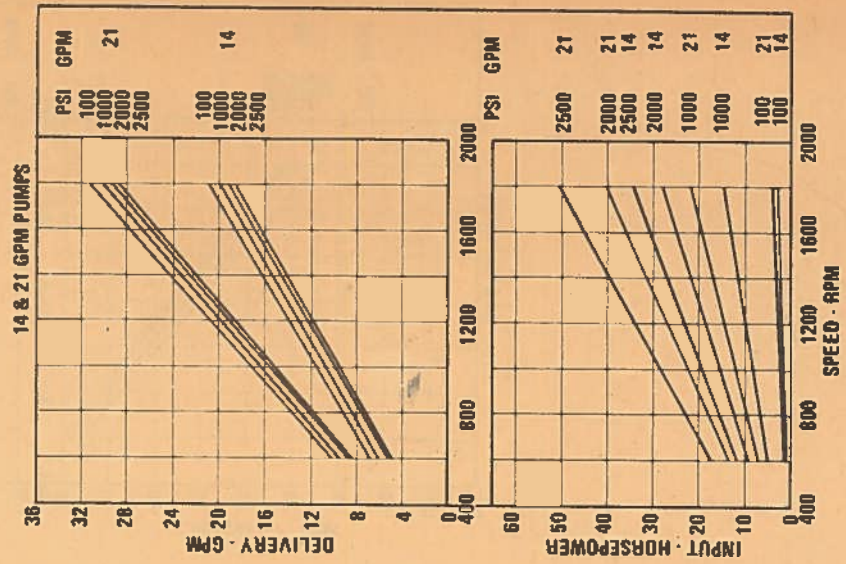
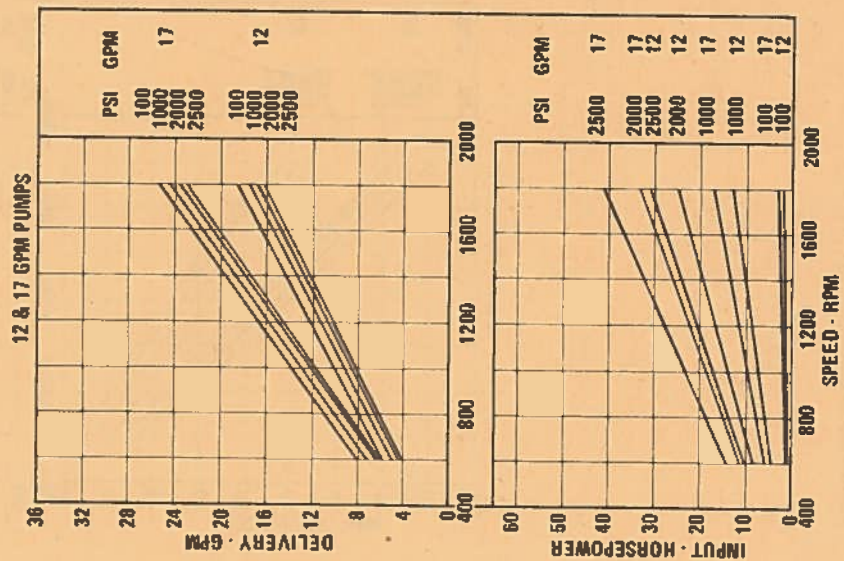
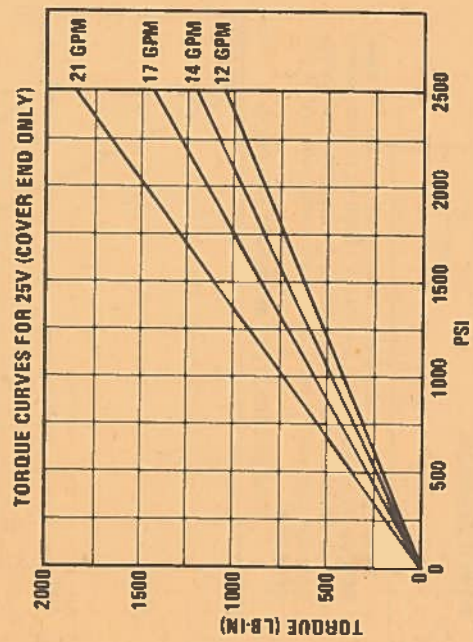
4-Bolt 4-Bolt 4-Bolt

Fig. Fig. Fig.



**TYPICAL PERFORMANCE CURVES 4525V (COVER END)**  
 DATA BASED ON OPERATION WITH  
 SAE 10W ANTI-WEAR OIL AT 120°F.

● Note: Maximum allowable torque on the no. 1 shaft 5600 lb. in., above 5600 lb. in. torque (7200 lb. in. maximum) the no. 86 shaft must be used. Check torque from each pump cartridge and add, if both pumps are under pressure at the same time.



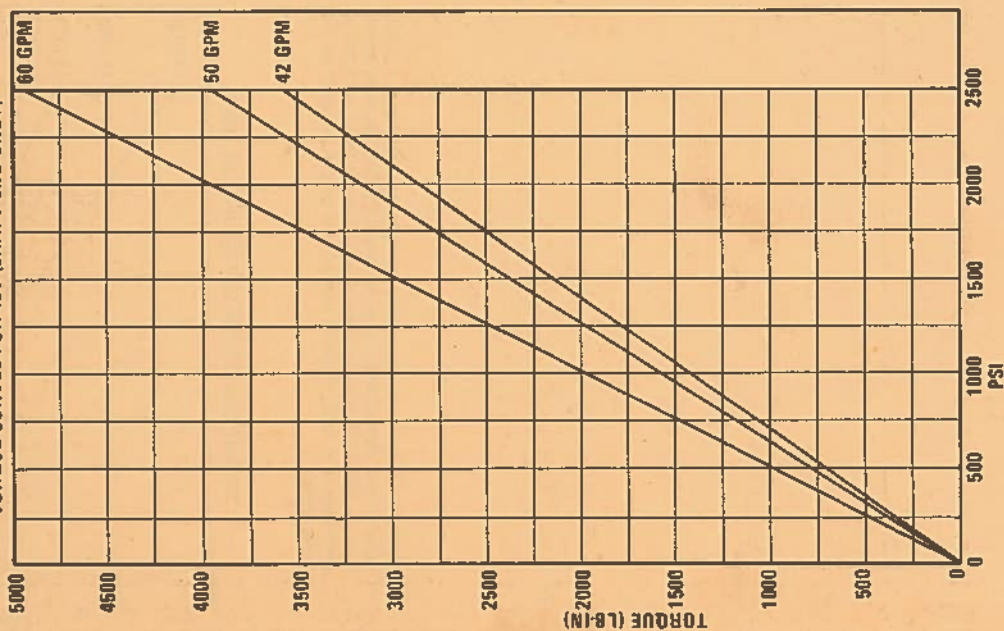




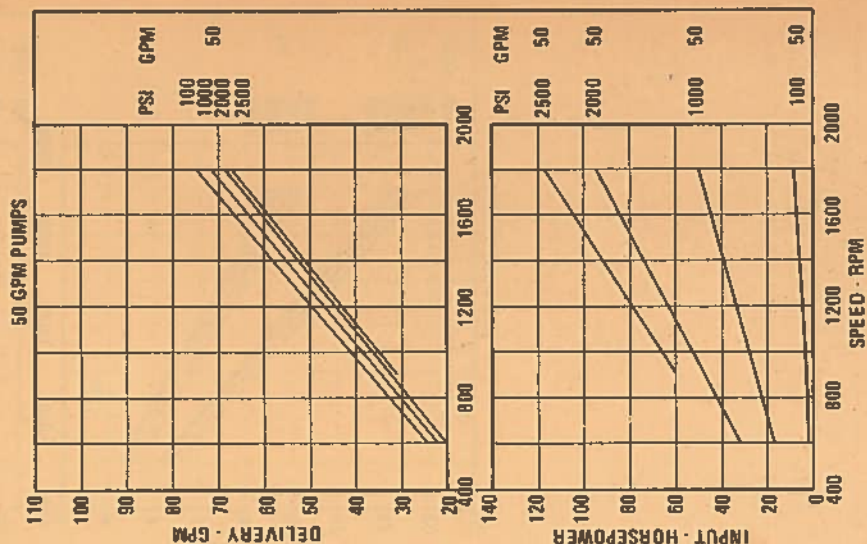
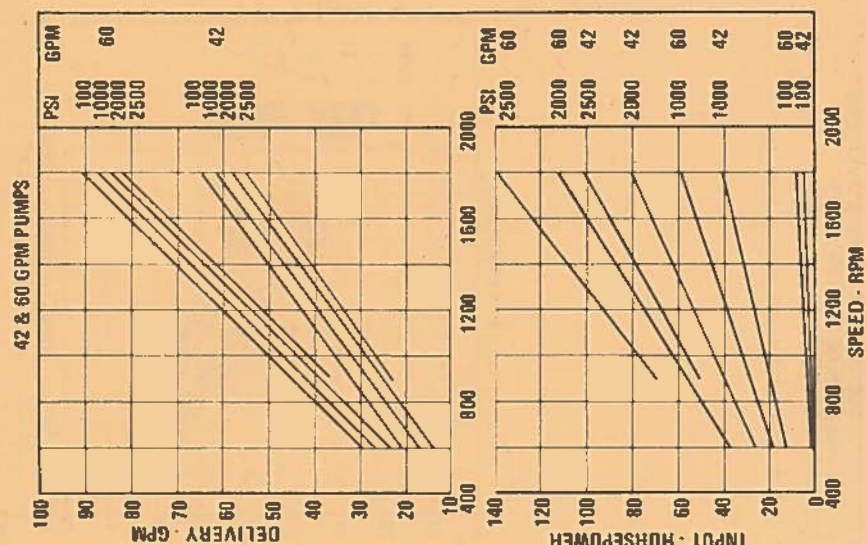
STANDARD GRAPHICAL  
SYMBOL FOR FLUID  
POWER DIAGRAM

Note: Maximum allowable torque on the no. 1 shaft 5600 lb. in., above 5600 lb. in. torque (7200 lb. in. maximum) the no. 86 shaft must be used. Check torque from each pump cartridge and add, if both pumps are under pressure at the same time.

TORQUE CURVES FOR 45V (SHAFT END ONLY)



TYPICAL PERFORMANCE CURVES 4525V (SHAFT END)  
DATA BASED ON OPERATION WITH  
SAE 10W ANTI-WEAR OIL AT 120°F.





**General Data**

Series 4535V pumps are of Sperry Vickers "balanced vane type" construction. Usable with all fluids listed.

**Ratings**

Maximum Speed (RPM)

Petroleum Oil..... 1800

Synthetic, Water Glycol and Water-in-oil Emulsion..... 1200

Maximum Pressure (PSI)

Petroleum Oil..... (25, 30, 35 & 38 Ring Sizes) 2500

Synthetic..... { 1200 RPM at 2500

Water Glycol..... { 1800 RPM at 2200

Water-in-oil Emulsion..... 2000

..... 2000

..... 1000

..... 1000

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**SPERRY VICKERS**  
TROY, MICHIGAN 48084

**PUMPS  
DOUBLE**

**FIXED  
DISPLACEMENT**

**VANE  
TYPE**

**COVER END 25-38 GPM  
SHAFT END 42-60 GPM**

**2-BOLT FLANGE  
OR FOOT MOUNTING**

**DWG. NO.  
505000**

**HIGH PERFORMANCE  
DOUBLE PUMPS**

**SERIES 4535V - 18° FIXED DISPLACEMENT - VANE TYPE  
FOR USE WITH OIL OR WATER GLYCOL, SYNTHETIC, AND  
WATER-IN-OIL EMULSION FIRE RESISTANT FLUIDS**

(25, 30, 35 & 38 Ring Sizes) 2500

{ 1200 RPM at 2500

{ 1800 RPM at 2200

2000

2000

1000

1000

1000

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1000

.625-11 UNC-28 Thd.

1.250 Deep - 4 Holes

.500

1.406

.703

.06 x 45°

.06

.50 R.

1.56 D.

1.250 ± .002 D.

1.375

2.750

1.38 R.

.500-13 UNC-28 Thd.

.938 Deep - 4 Holes

.62

1.50 Dia. Outlet

Connection No. 1

Accepts Sperry Vickers

Model FL1-12-12P-10 or

FL1-12-12W-10 Flange

4.00 Dia. Inlet

Connection

Accepts Sperry Vickers

Model FL1-32-32W-10 Flange

5.50 D.

2.562

5.125

.56 R.

3.062

1.531

.593

1.187

2.312

1.156

.44 R.

1.187

.593

1.187

.593

1.187

.593

1.187

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1.187

.593

1.187

.593

1.187

.593

1.187

.593

.625-11 UNC-28 Thd.

1.250 Deep - 4 Holes

.500

1.406

.703

.06 x 45°

.06

.50 R.

1.56 D.

1.250 ± .002 D.

1.375

2.750

1.38 R.

.500-13 UNC-28 Thd.

.938 Deep - 4 Holes

.62

1.50 Dia. Outlet

Connection No. 1

Accepts Sperry Vickers

Model FL1-12-12P-10 or

FL1-12-12W-10 Flange

4.00 Dia. Inlet

Connection

Accepts Sperry Vickers

Model FL1-32-32W-10 Flange

5.50 D.

2.562

5.125

.56 R.

3.062

1.531

.593

1.187

2.312

1.156

.44 R.

1.187

.593

1.187

.593

1.187

.593

1.187

.593

1.187

.593

1.187

.593

1.187

.593

1.187

.593

.375 Sq. x 2.00 Long Key.

Keyway Inside Corner Fillets

Are .020 R. Max. Key Corners

Must Clear.

1.667

1.658

.015 R.

.025 R.

.08

.344

.06 x 45°

1.498 D.

1.498 D.

1.498 D.

1.498 D.

1.498 D.

1.498 D.

1.498 D.

1.498 D.

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1.498 D.

1.498 D.

1.498 D.

1.498 D.

.625-11 UNC-28 Thd.

1.250 Deep - 4 Holes

.500

1.406

.703

.06 x 45°

.06

.50 R.



## General Data

Series 4535V pumps are of Sperry Vickers "balanced vane type" construction. Usable with all fluids listed.

Filtration (Mandatory). . . . . 25 Micron or Less

## Drive Data

### Shaft Rotation

Pumps are normally assembled for right hand or clockwise rotation as viewed from the shaft end. If left hand or counterclockwise rotation is required, specify by adding the symbol "L" to the model number.

Example: 4535V-60A35-1CC10L-180

Inlet and outlet ports remain the same regardless of direction of shaft rotation. Change of assembly of internal parts is necessary when change of shaft rotation is required.

## Pump Drive

Pump is recommended for direct coaxial drive. If drives imposing radial shaft loads are considered, consult your Sperry Vickers sales representative.

Minimum Recommended Drive Speed. . . . . 600 RPM

Maximum Speed, Ratings and Inlet Vacuum are tabulated for four types of fluid. These are influenced by specific gravity, viscosity and suction head. Pump suction and speed should be related so that vacuum at pump inlet does not exceed 5" of mercury for petroleum oil and water glycol; 3" for synthetic and water-in-oil emulsion fluids.

## Ratings

Maximum Speed (RPM)  
Petroleum Oil. . . . . 1800  
Synthetic Water Glycol and Water-in-oil Emulsion. . . . . 1200

Maximum Pressure (PSI)  
Petroleum Oil. . . . . (25, 30, 35 & 38 Ring Sizes) 2500  
42, 50 & 60 Ring Sizes { 1200 RPM at 2500  
1800 RPM at 2000  
2000 RPM at 2000  
2000 RPM at 1000

## Special Information

Note: Do not run a pump with the outlet pressure lower than the inlet pressure. This causes operating noise and vane instability.  
The no. 86 shaft is recommended for most applications and always when shaft torque exceeds no. 1 shaft rating.

## Air Bleed

At time of first starting, if the pump does not immediately prime, air should be bled from pump delivery line. This may be accomplished by loosening a connection in the delivery line close to the pump until oil flows, indicating pump has primed. An airbleed valve is available for this purpose. See drawing 521601.

## Caution:

There is no case drain connection. The pump is drained internally into its inlet. Pressure at the pump inlet connection may not exceed 20 PSI.

## Fluids and Temperature Data

Petroleum Oils - Use antiwear industrial hydraulic oils or automotive crankcase oils having letter designations SC, SD or SE.

Running viscosity range 70 to 250 SUS. Operating temperature 120°F. recommended, 150°F. usual maximum.

For details, refer to hydraulic fluid and temperature recommendations for industrial machinery, data sheet I-286-S in catalogue.

Water Glycols - Select fluids with an operating viscosity of the petroleum oil described above. Recommended maximum temperature 130°F.

Water-in-oil Emulsion may be used however, they require careful selection and monitoring of the fluid. For assistance contact Sperry Vickers representative. Soluble oil-in-water solutions not recommended.

Synthetic Fire Resistant Fluids - Phosphate esters and their blends with operating viscosity of the petroleum oil described above. These fluids are generally compatible with fluorocarbon and silicone lastomers. Add F3 prefix to the model number.

## Ordering Instructions

Select pumps according to the typical model code shown. Available standard options are listed in this code.

## Electric Motor Pumps

Many motor manufacturers are prepared to furnish drip proof or totally enclosed motors with end bells on which this pump can be mounted.

Sound Data (With 60 and 38 GPM Rings)

Sound level is 74 db(A) at 1200 RPM and 2000 PSI using SAE 10W oil at 120°F. 5" Hg inlet. Tested per ISO draft international standard 4412.

Weight Lbs. (Approx.)

4535V-\*\*\*-10-180 (Std. 2-Bolt Mounting). . . . . 118  
4535V-\*\*\*-10-181 (Foot Mounting). . . . . 131

## Typical Model Code

F3 - 4535 V 60 A 35 - 1 CC 10 L - \*\*\*  
Special Seals  
Omit If Not Required. See Fluids Note  
Series Designation  
Vane Pump  
Capacity - Shaft End Pump  
(SAE Rating 1200 RPM - 100 PSI)  
42 - 42 GPM 60 - 60 GPM  
50 - 50 GPM  
Rotation (Viewed From Shaft End)  
L - Left Hand  
(Right Hand Rotation Need Not Be Specified In Model)  
Design Number  
Design Numbers Subject To Change. Installation Dimensions Remain The Same For Design Numbers 10 Thru 19.  
Outlet Positions (Viewed From Cover End)  
(With Outlet No. 1 Opposite Inlet)  
AA No. 2 Outlet Opposite Inlet  
AB No. 2 Outlet 90° CCW From Inlet  
AC No. 2 Outlet Inline With Inlet  
AD No. 2 Outlet 90° CW From Inlet  
(With No. 1 Outlet 90° CCW From Inlet)  
BA No. 2 Outlet Opposite Inlet  
BB No. 2 Outlet 90° CCW From Inlet  
BC No. 2 Outlet Inline With Inlet  
BD No. 2 Outlet 90° CW From Inlet  
(With No. 1 Outlet Opposite Inlet)  
CA No. 2 Outlet Opposite Inlet  
CB No. 2 Outlet 90° CCW From Inlet  
CC No. 2 Outlet Inline With Inlet  
CD No. 2 Outlet 90° CW From Inlet  
(With No. 1 Outlet 90°)  
(With No. 1 Outlet 90° CW From Inlet)  
DA No. 2 Outlet Opposite Inlet  
DB No. 2 Outlet 90° CCW From Inlet  
DC No. 2 Outlet Inline With Inlet  
DD No. 2 Outlet 90° CW From Inlet

## Port Connections

Inlet	Outlet
No. 1	No. 2
SAE 4-Bolt Flg.	SAE 4-Bolt Flg.
A	A

Capacity - Cover End Pump  
(SAE Rating 1200 RPM - 100 PSI)  
25 - 25 GPM 35 - 35 GPM  
30 - 30 GPM 38 - 38 GPM

## Shaft Type

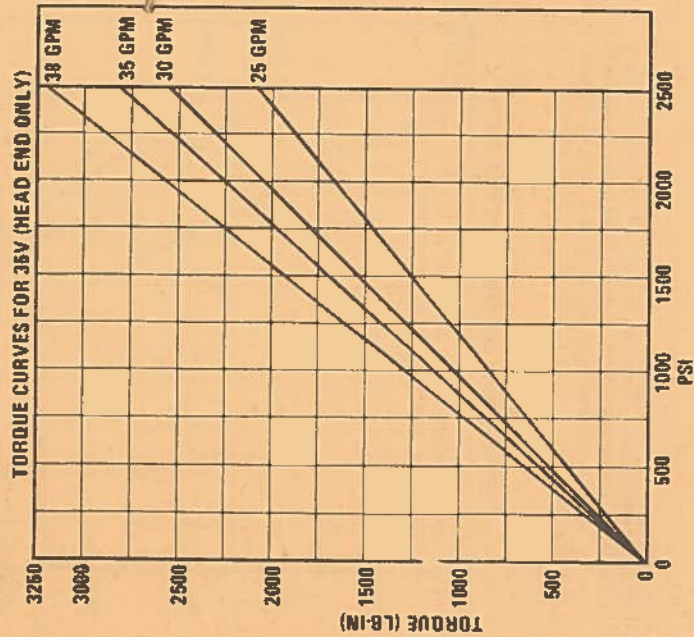
1 - Straight Keyed Standard  
86 - Straight Keyed (Heavy Duty)



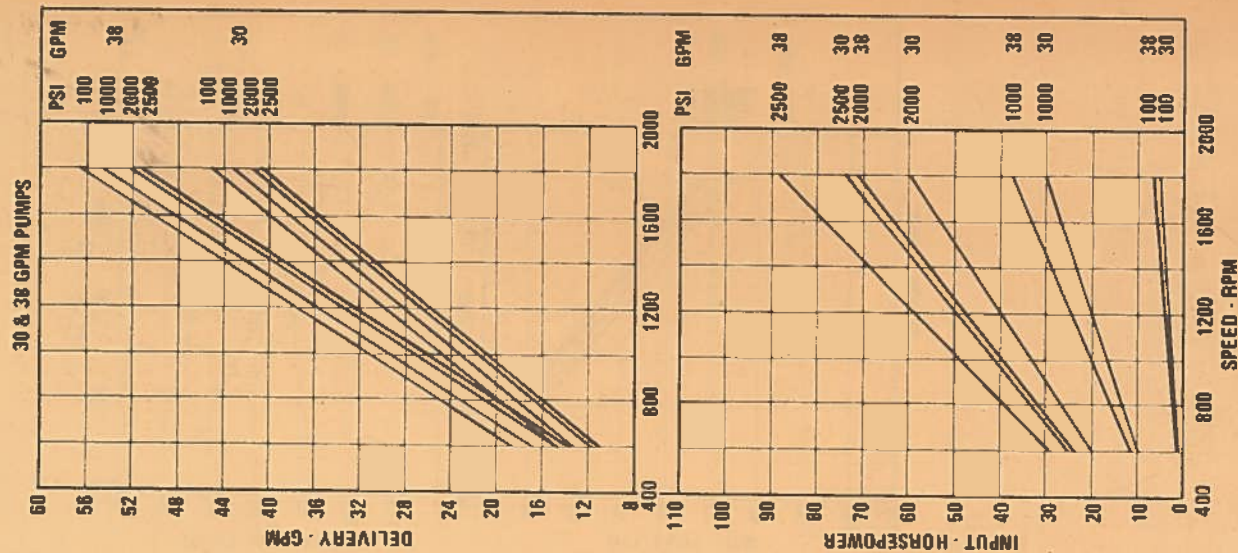
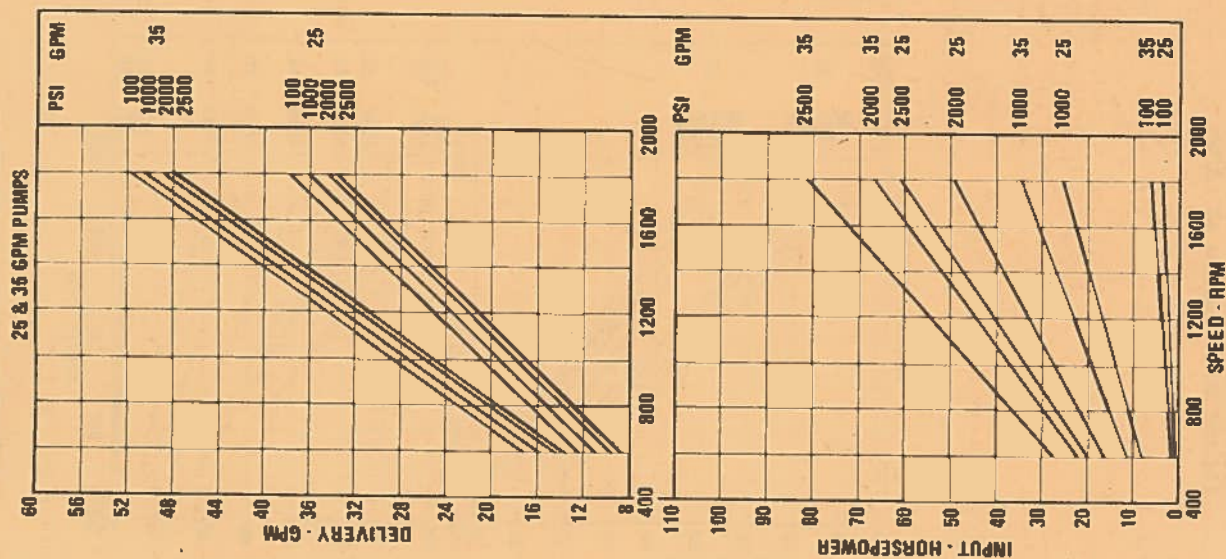


STANDARD GRAPHICAL  
SYMBOL FOR FLUID  
POWER DIAGRAM

● Note: Maximum allowable torque on the no. 1 shaft 5800 lb. in., above 5600 lb. in. maximum) the no. 86 shaft must be used. Check torque from each pump cartridge and add, if both pumps are under pressure at the same time.



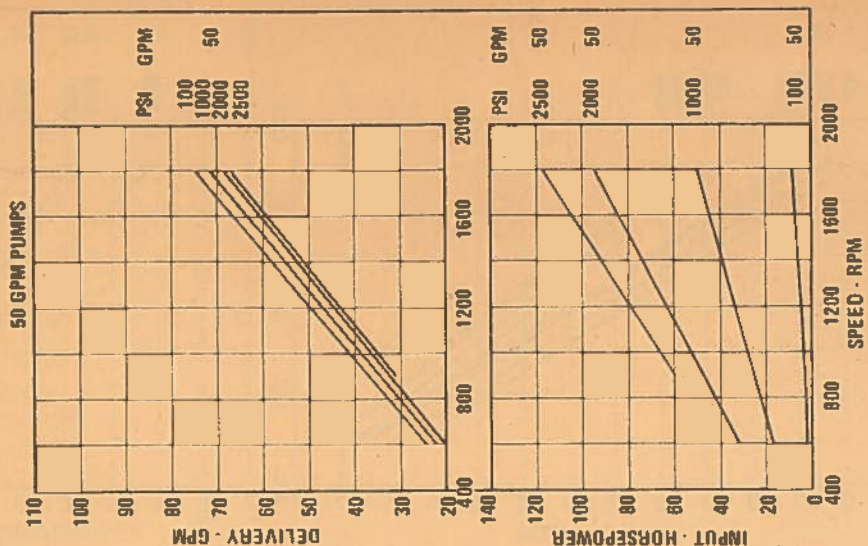
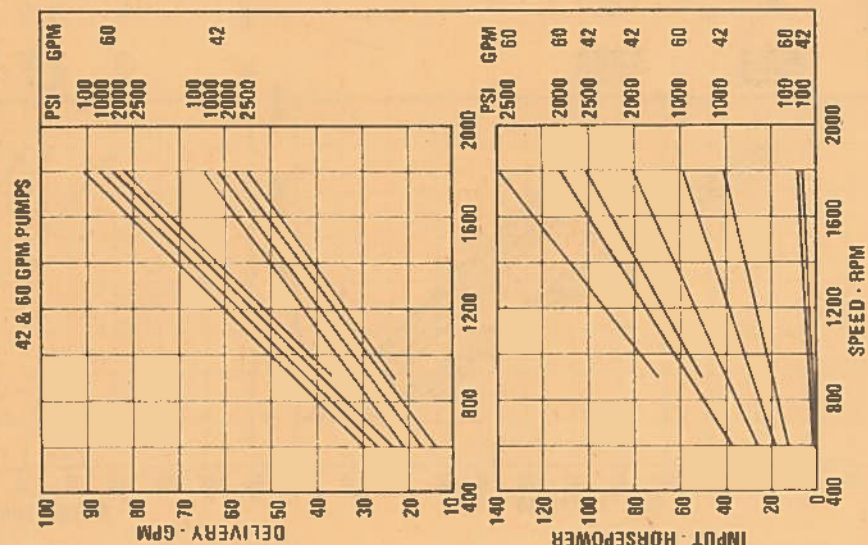
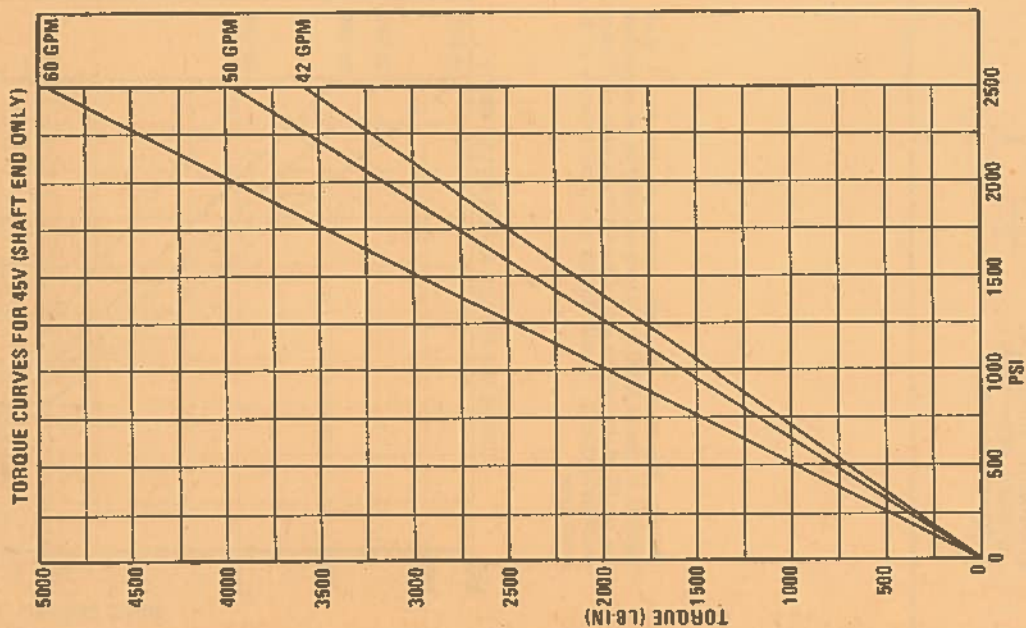
TYPICAL PERFORMANCE CURVES 4636V (HEAD END)  
DATA BASED ON OPERATION WITH  
SAE 10W ANTI-WEAR OIL AT 120°F.





TYPICAL PERFORMANCE CURVES 4535V (SHAFT END)  
DATA BASED ON OPERATION WITH  
SAE 10W ANTI-WEAR OIL AT 120°F.

● Note: Maximum allowable torque on the no. 1 shaft 5600 lb. in., above 5600 lb. in. torque (7200 lb. in. maximum) the no. 86 shaft must be used. Check torque from each pump cartridge and add, if both pumps are under pressure at the same time.





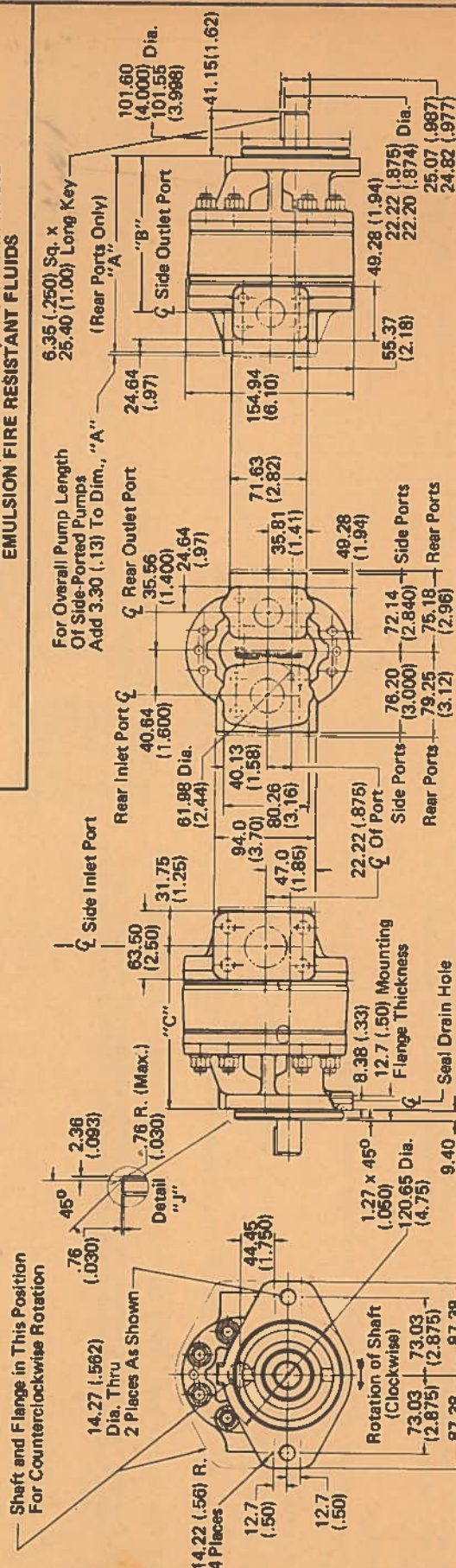
## SINGLE GEAR PUMPS

## HIGH PERFORMANCE – HIGH EFFICIENCY

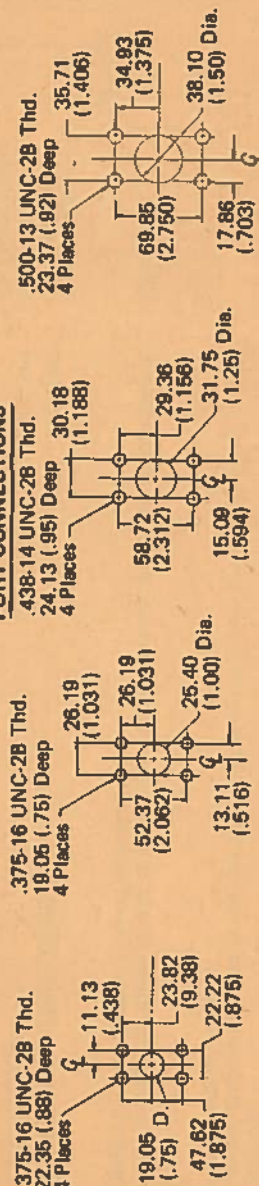
# STERN-VICKERS

**MODEL SERIES G20-30 DESIGN FIXED DISPLACEMENT - GEAR TYPE  
FOR USE WITH OIL, SYNTHETIC, AND WATER-IN-OIL  
EMULSION FIRE RESISTANT FLUIDS**

**Dimensions Shown In  
Millimeters (Inches)**

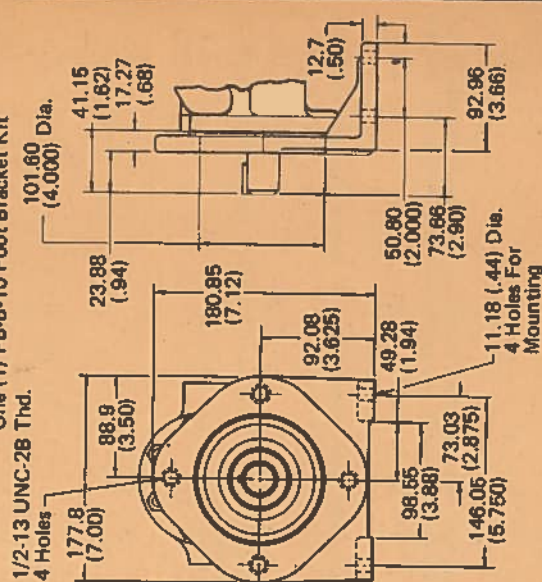


## PORT CONNECTIONS



## FOOT MOUNTING

**Note:** Foot mounting must be ordered separately.  
**Example:** One (1) G20-2D13B1-A 1D-30 Pump  
 One (1) FB-8-10 Foot Bracket Kit



Model	Nominal Delivery @ 1200 RPM LPM	Theoretical Displacement Per Rev. mL (Cu. In.)	Rated Speed (RPM)	Rated Pressure (PSI)	Min. Speed @ Rated Pressure RPM	Approx. Wt. kg (Lbs.)	"A" mm (Inch)	"B" mm (Inch)	"C" mm (Inch)
G20-2-7***30	26.5 ( 7)	23 (1.40)	1800	172 (2500)	1200	27.1 (12.3)	154.7 (6.09)	117.5 (4.63)	123.2 (4.85)
G20-2-9***30	34.0 ( 9)	29 (1.79)			1000	27.5 (12.5)	159.3 (6.27)	122.2 (4.81)	127.8 (5.03)
G20-2-11***30	41.5 (11)	36 (2.17)			900	27.8 (12.6)	163.8 (6.45)	126.8 (4.99)	132.3 (5.21)
G20-2-13***30	49.0 (13)	43 (2.60)			800	28.2 (12.8)	168.7 (6.64)	131.6 (5.18)	137.2 (5.40)
G20-2-15***30	57.0 (15)	48 (2.94)	1800	155 (2250)	800	28.6 (13.0)	172.7 (6.80)	135.5 (5.34)	141.2 (5.56)
G20-2-17***30	64.5 (17)	55 (3.33)			600	29.0 (13.1)	177.0 (6.97)	140.0 (5.51)	145.5 (5.73)
G20-2-19***30	72.0 (19)	62 (3.76)			600	29.3 (13.3)	182.1 (7.17)	145.0 (5.71)	150.6 (5.93)
G20-2-21***30	79.5 (21)	68 (4.12)			600	29.7 (13.5)	186.4 (7.34)	149.4 (5.88)	154.9 (6.10)
G20-2-24***30	91.0 (24)	77 (4.71)	1800	138 (2000)	600	30.3 (13.7)	193.3 (7.61)	156.2 (6.15)	161.8 (6.37)
G20-2-27***30	102.0 (27)	87 (5.30)			500	30.8 (14.0)	200.2 (7.88)	163.1 (6.42)	168.7 (6.64)

RELEASED 12-1-78

040905



# General Data

Sperry Vickers model G20 series pumps are high performance, high efficiency external spur gear, fixed displacement design.

Filtration (Mandatory).....25 Micron or Less

# Shaft Rotation

Pumps are normally assembled for right hand (clockwise) rotation as viewed from the shaft end. If left hand (counterclockwise) rotation is required, specify by adding the symbol "L" to the model number.

Example: G20-2D13B1-A1D30L

# Port Connections

Inlet and outlet ports are located in the rear cover of the pump. Either SAE 4-bolt flange or SAE straight thread ports are standard.

# Pump Drive

Pump is recommended for direct coaxial drive. If drives imposing radial shaft loads are considered, please consult your local Sperry Vickers Representative.

# Ratings

Maximum and Minimum Speeds (RPM)..... See Chart  
Maximum Pressure (PSI)..... See Chart

# Air Bleed

At time of first starting, if pump does not prime immediately, air should be bled from pump delivery line. This may be accomplished by loosening a connection in the delivery line close to the pump until oil flows, indicating pump has primed. An airbleed valve is available for this purpose. See drawing 521601.

# Inlet Conditions

Pressure on inlet should not exceed 15 PSI. Under continuous operation, the inlet vacuum should not exceed 5 inches of mercury.

# Fluids and Temperature Data

Petroleum Oils - Use antiwear industrial hydraulic oils or automotive crankcase oils having letter designations SC, SD or SE.

Running viscosity range 70 to 250 SUS. Operating temperature 120°F. recommended, 150°F. usual maximum.

For details refer to data sheet I-286-S for hydraulic fluid and temperature recommendations.

Water-in-oil Emulsion may be used, however, they require careful selection and monitoring of the fluid. For assistance, contact your local Sperry Vickers Representative. Soluble-oil-in-water solutions are not recommended.

Synthetic Fire Resistant Fluids - Phosphate esters and their blends with operating viscosity of the petroleum oil described above. These fluids are generally compatible with fluorocarbon and silicone elastomers. Add prefix "F3" to the model number.

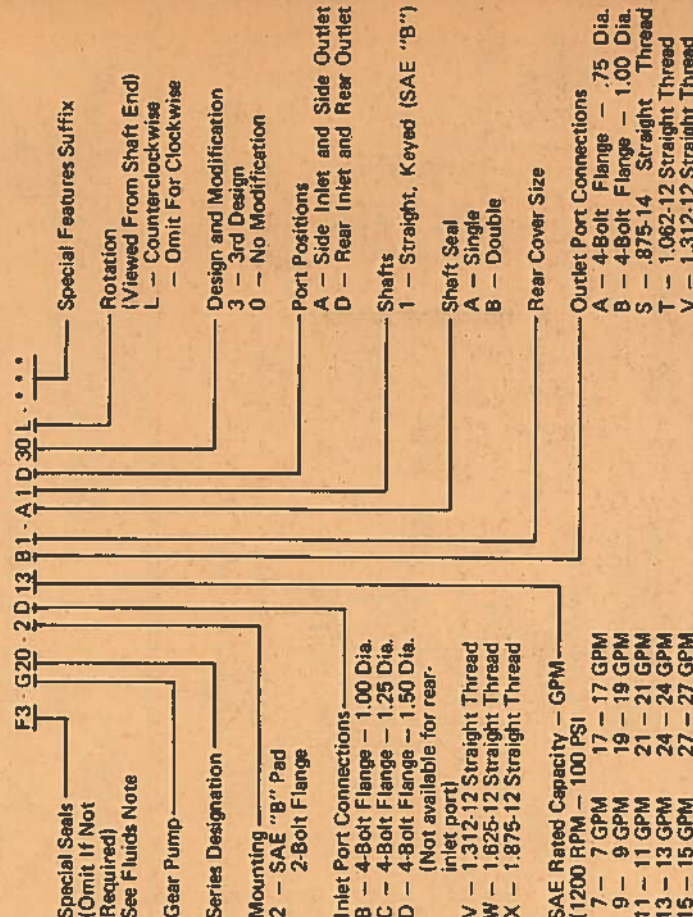
# Ordering Instructions

Select pumps according to the typical model code shown. Available standard options are listed in this code.

# Electric Motor Pumps

Many motor manufacturers are prepared to furnish drip proof or totally enclosed motors with end bells on which these pumps can be mounted.

# Model Code





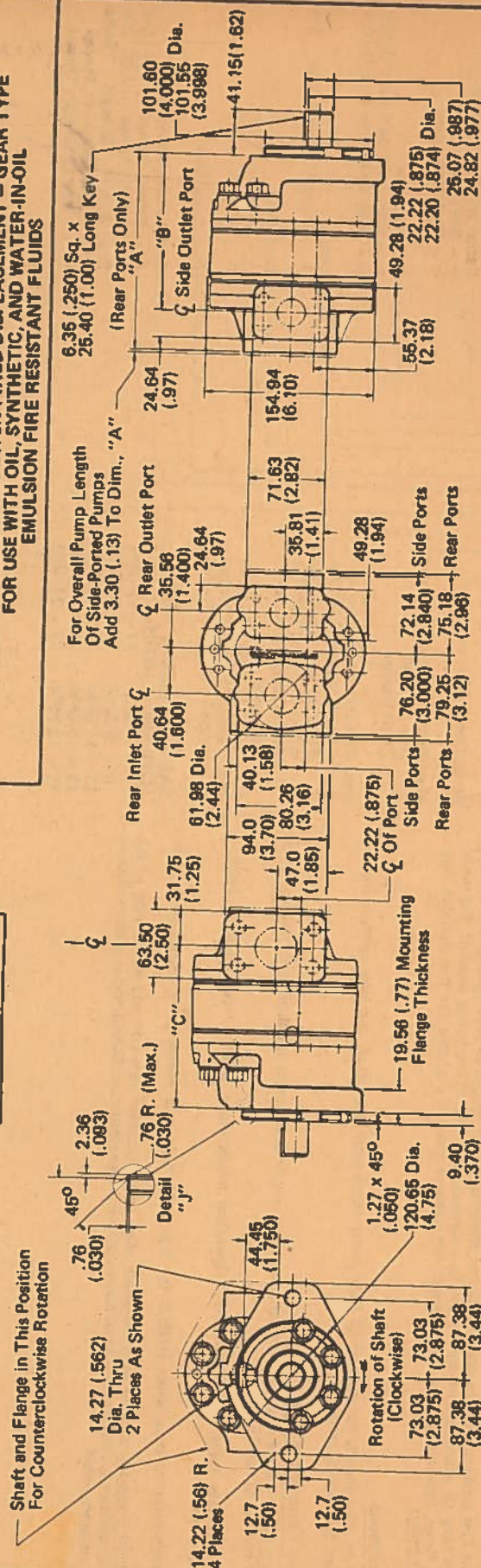
## SINGLE GEAR PUMPS

## HIGH PERFORMANCE — HIGH EFFICIENCY

STERN + VICKERS

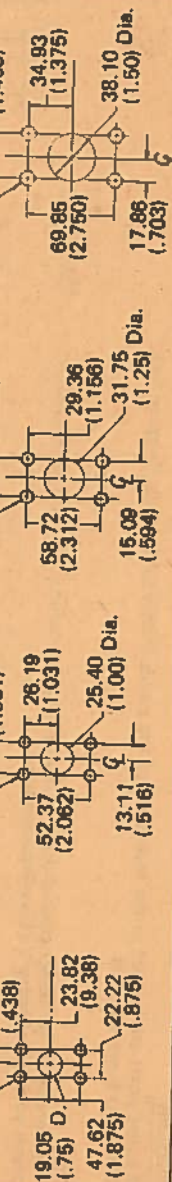
**MODEL SERIES G20-40 DESIGN FIXED DISPLACEMENT - GEAR TYPE  
FOR USE WITH OIL, SYNTHETIC, AND WATER-IN-OIL  
EMULSION FIRE RESISTANT FLUIDS**

**Dimensions Shown In  
Millimeters (Inches)**

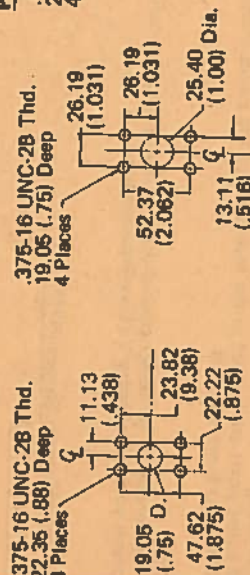


## FOOT MOUNTING

**Note:** Foot mounting must be ordered separately.  
Example: One (1) G20-2D13B1-A 1D-30 Pump  
One (1) FB-B-10 Foot Bracket Kit



## PORT CONNECTIONS



Model	Nominal Delivery @ 1200 RPM LPM (GPM)	Theoretical Displacement Per Rev. mL (Cu. In.)	Rated Speed (RPM)	Rated Pressure bar (PSI)	Min. Speed @ Rated Pressure RPM	Approx. Wt. kg (Lbs.)	"A" mm (inch)	"B" mm (inch)	"C" mm (inch)
G20-2*2*7**	26.5 (7)	23 (1.40)	1800	172 (2500)	1200	27.1 (12.3)	137.2 (5.40)	100.1 (3.94)	105.7 (4.16)
G20-2*2*9**	34.0 (9)	29 (1.79)			1000	27.5 (12.5)	141.5 (5.57)	104.4 (4.11)	110.0 (4.33)
G20-2*11**	41.5 (11)	36 (2.17)			900	27.8 (12.6)	146.1 (5.75)	109.0 (4.29)	114.6 (4.51)
G20-2*13**	49.0 (13)	43 (2.60)			800	28.2 (12.8)	150.8 (5.94)	113.8 (4.48)	119.4 (4.70)
G20-2*15**	57.0 (15)	48 (2.94)	1800	155 (2250)	800	28.6 (13.0)	154.8 (6.10)	117.9 (4.64)	123.4 (4.86)
G20-2*17**	64.5 (17)	55 (3.33)			800	28.9 (13.1)	159.5 (6.28)	122.4 (4.82)	128.1 (5.04)
G20-2*19**	72.0 (19)	62 (3.78)			800	29.3 (13.3)	164.6 (6.48)	127.6 (5.02)	133.1 (5.24)
G20-2*21**	79.5 (21)	68 (4.12)			800	29.7 (13.5)	168.7 (6.64)	131.6 (5.18)	137.2 (5.40)
G20-2*24**	91.0 (24)	77 (4.71)	124 (1800)	138 (2000)	800	30.3 (13.7)	175.5 (6.91)	138.4 (5.45)	144.0 (5.67)
G20-2*27**	102.0 (27)	87 (5.30)			600	30.8 (14.0)	182.4 (7.18)	143.3 (5.72)	150.9 (5.94)

RELEASED 12-1-78

508100

SEC  
b



### General Data

Sperry Vickers model G20 series pumps are high performance, high efficiency external spur gear, fixed displacement design.

Filtration (Mandatory). . . . . 25 Micron or Less

### Shaft Rotation

Pumps are normally assembled for right hand (clockwise) rotation as viewed from the shaft end. If left hand (counterclockwise) rotation is required, specify by adding the symbol "L" to the model number.

Example: G20-2D13B1-A1D 40L

### Port Connections

Inlet and outlet ports are located in the rear cover of the pump. Either SAE 4 bolt flange or SAE straight thread ports are standard.

### Pump Drive

Pump is recommended for direct coaxial drive. If drives imposing radial shaft loads are considered, please consult your local Sperry Vickers Representative.

### Ratings

Maximum and Minimum Speeds (RPM). . . . . See Chart

Maximum Pressure (PSI). . . . . See Chart

### Air Bleed

At time of first starting, if pump does not prime immediately, air should be bled from pump delivery line. This may be accomplished by loosening a connection in the delivery line close to the pump until oil flows, indicating pump has primed. An airbleed valve is available for this purpose. See drawing 521601.

### Inlet Conditions

Pressure on inlet should not exceed 15 PSI. Under continuous operation, the inlet vacuum should not exceed 5 inches of mercury.

### Fluids and Temperature Data

Petroleum Oils Use antiwear industrial hydraulic oils or automotive crankcase oils having letter designations SC, SD or SE.

Running viscosity range 70 to 250 SUS. Operating temperature 120°F. recommended, 150°F. usual maximum.

For details refer to data sheet 1-286-S for hydraulic fluid and temperature recommendations.

Water-in-oil Emulsion may be used, however, they require careful selection and monitoring of the fluid. For assistance, contact your local Sperry Vickers Representative. Soluble-oil-in-water solutions are not recommended.

Synthetic Fire Resistant Fluids — Phosphate esters and their blends with operating viscosity of the petroleum oil described above. These fluids are generally compatible with fluorocarbon and silicone elastomers. Add prefix "F3" to the model number.

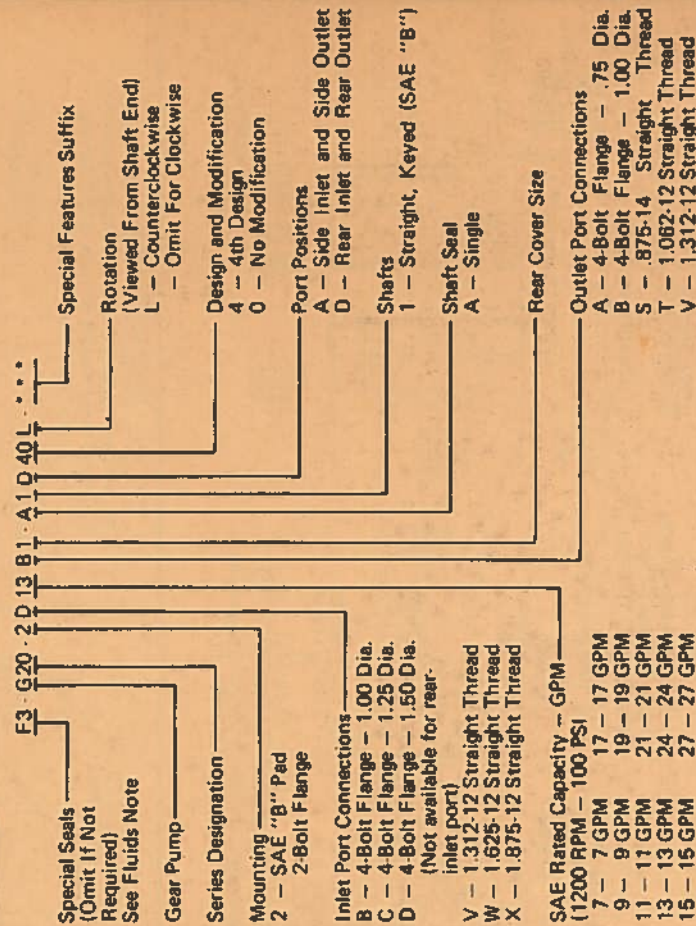
### Ordering Instructions

Select pumps according to the typical model code shown. Available standard options are listed in this code.

### Electric Motor Pumps

Many motor manufacturers are prepared to furnish drip proof or totally enclosed motors with end bells on which these pumps can be mounted.

### Model Code





**SPERRY VICKERS**  
TROY, MICHIGAN 48064

**SINGLE GEAR PUMPS**

**FIXED DISPLACEMENT**

**RATED CAPACITIES FROM 18-50 GPM @ 1200 RPM & 100 PSI**

**2-BOLT FLANGE OR FOOT MOUNTING**

**DWG. NO. 506200**

# **SPERRY VICKERS**

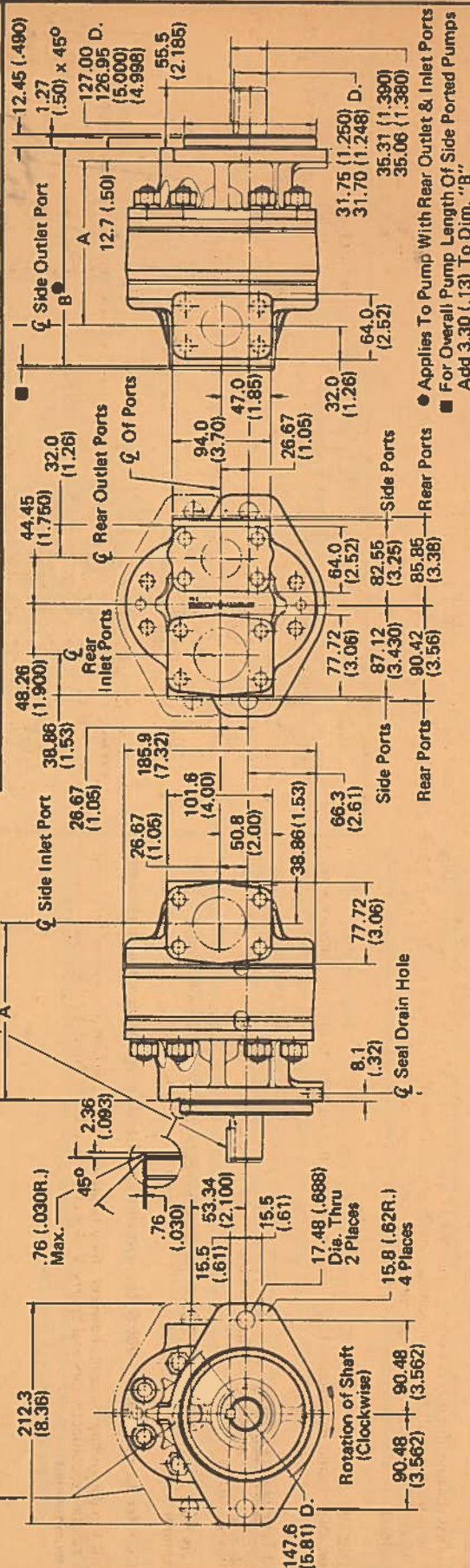
**SINGLE GEAR PUMPS**  
HIGH PERFORMANCE - HIGH EFFICIENCY

MODEL SERIES G30-31 DESIGN FIXED DISPLACEMENT - GEAR TYPE FOR USE WITH OIL, SYNTHETIC, AND WATER-IN-OIL EMULSION FIRE RESISTANT FLUIDS

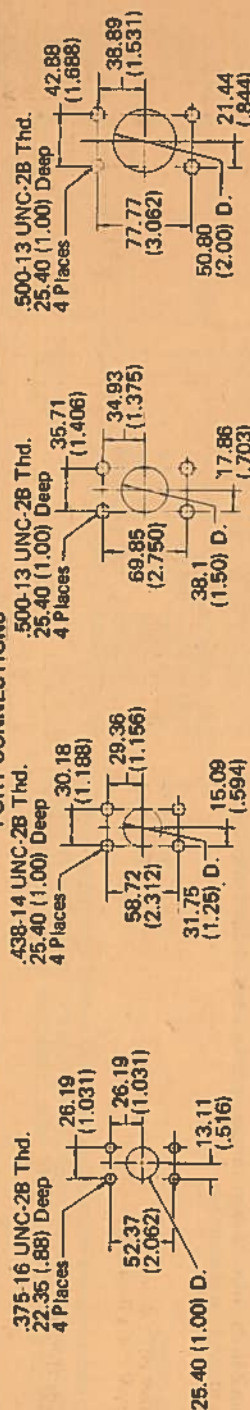
Dimensions Shown In Millimeters (Inches)

Shaft and Flange in This Position For Counterclockwise Rotation

7.93 (.312) Sq. x 31.75 (1.25) Long Key



## **PORT CONNECTIONS**



Model	Nominal Delivery @ 1200 RPM LPM (GPM)	Theo. Disp. Per Rev. mL (Cu. In.)	Rated Speed (RPM)	Rated Pressure bar (PSI)	Min. Speed @ Rated Pressure RPM	Weight (Approx.) kg (Lbs.)	"A" mm (Inch)	"B" mm (Inch)
G30-18*2-***31	68.13 (18)	58 (3.54)	1800	172 (2500)	800	21.0 (46.2)	151.4 (5.96)	190.3 (7.49)
G30-21*2-***31	79.49 (21)	58 (4.12)				21.3 (47.0)	156.2 (6.15)	195.1 (7.68)
G30-25*2-***31	94.63 (25)	80 (4.91)				21.8 (48.1)	162.3 (6.39)	201.2 (7.92)
G30-30*2-***31	113.55 (30)	97 (5.89)				22.4 (49.4)	170.2 (6.70)	209.0 (8.23)
G30-35*2-***31	132.48 (35)	113 (6.87)	1500	155 (2250)	800	23.0 (50.8)	178.1 (7.01)	216.9 (8.54)
G30-40*2-***31	151.40 (40)	129 (7.86)				23.7 (52.2)	183.9 (7.32)	224.8 (8.85)
G30-45*2-***31	170.33 (45)	145 (8.84)				24.3 (53.5)	193.8 (7.63)	232.7 (9.16)
G30-50*2-***31	188.25 (50)	161 (9.82)				24.9 (54.9)	201.7 (7.94)	240.5 (9.47)

RELEASED 12-1-78

506200



**General Data**

Sperry Vickers model G30 series pumps are high performance, high efficiency external spur gear, fixed displacement design.

Filtration (Mandatory)..... 25 Micron or Less

**Shaft Rotation**

Pumps are normally assembled for right hand (clockwise) rotation as viewed from the shaft end. If left hand (counterclockwise) rotation is required, specify by adding the symbol "L" to the model number.

Example: G30-7D18B2-A1DA-31L

**Port Connections**

Inlet and outlet ports are located in the rear cover of the pump. Either SAE 4-bolt flange or SAE straight thread ports are standard.

**Pump Drive**

Pump is recommended for direct coaxial drive. If drives imposing radial shaft loads are considered, please consult your local Sperry Vickers Representative.

**Ratings**

Maximum and Minimum Speeds (RPM)..... See Chart  
Maximum Pressure (PSI)..... See Chart

**Air Bleed**

At time of first starting, if pump does not prime immediately, air should be bled from pump delivery line. This may be accomplished by loosening a connection in the delivery line close to the pump until oil flows, indicating pump has primed. An airbleed valve is available for this purpose. See drawing 521601.

**Inlet Conditions**

Pressure on inlet should not exceed 15 PSI. Under continuous operation, the inlet vacuum should not exceed 5 inches of mercury.

**Fluids and Temperature Data**

Petroleum Oils - Use antiwear industrial hydraulic oils or automotive crankcase oils having letter designations SC, SD or SE.

Running viscosity range 70 to 250 SUS. Operating temperature 120°F. recommended, 150°F. usual maximum.

For details refer to data sheet 1-286-S for hydraulic fluid and temperature recommendations. Water-in-oil Emulsion may be used, however, they require careful selection and monitoring of the fluid. For assistance, contact your local Sperry Vickers Representative. Soluble oil-in-water solutions are not recommended.

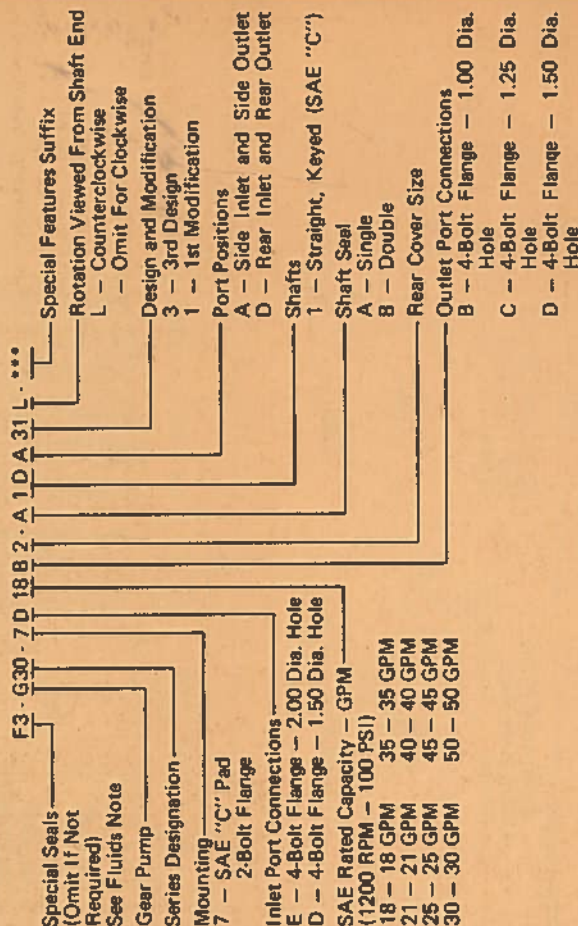
Synthetic Fire Resistant Fluids - Phosphate esters and their blends with operating viscosity of the petroleum oil described above. These fluids are generally compatible with fluorocarbon and silicone elastomers. Add prefix "F3" to the model number.

**Ordering Instructions**

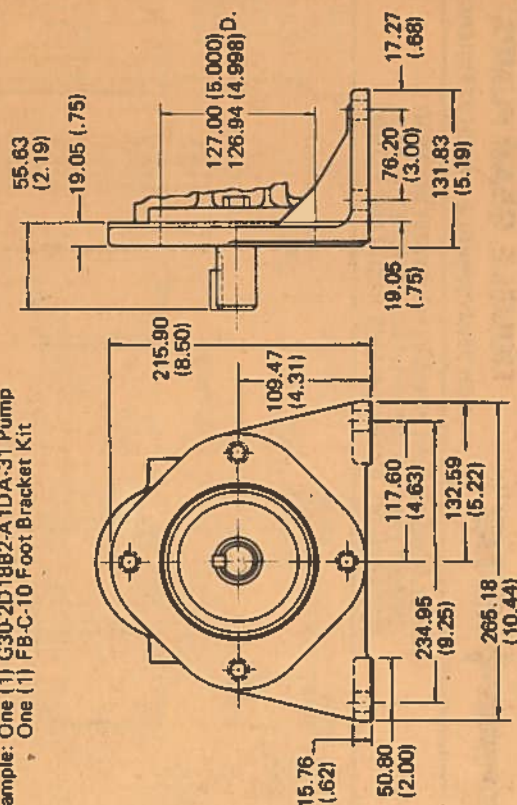
Select pumps according to the typical model code shown. Available standard options are listed in this code.

**Electric Motor Pumps**

Many motor manufacturers are prepared to furnish drip proof or totally enclosed motors with end bells on which these pumps can be mounted.

**Model Code****FOOT MOUNTING**

Note: Foot Mounting must be ordered separately.  
Example: One (1) G30-2D18B2-A1DA-31 Pump  
One (1) FB-C-10 Foot Bracket Kit





**SPERRY VICKERS**  
TROY, MICHIGAN 48064

**DOUBLE  
GEAR  
PUMPS**

**FIXED  
DISPLACEMENT**

**RATED CAPACITIES  
FROM 7-27 GPM  
@ 1200 RPM & 100 PSI**

**2-BOLT FLANGE  
OR  
FOOT MOUNTING**

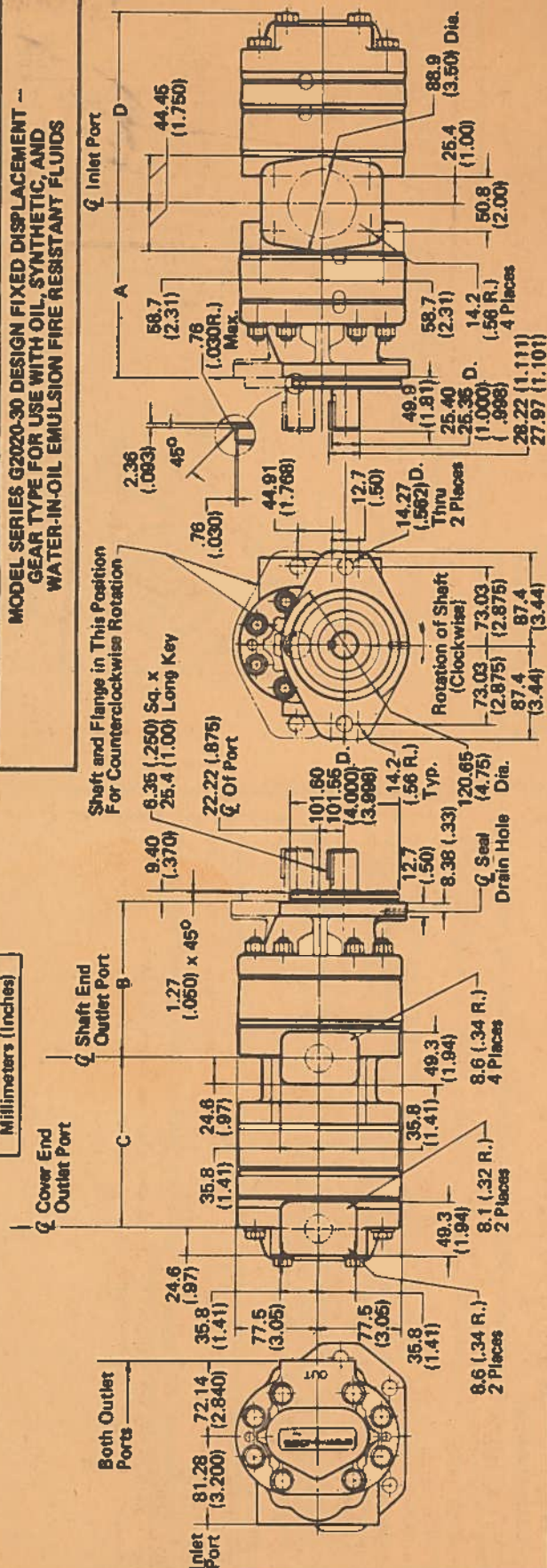
**DWG. NO.  
506300**

# DOUBLE GEAR PUMPS

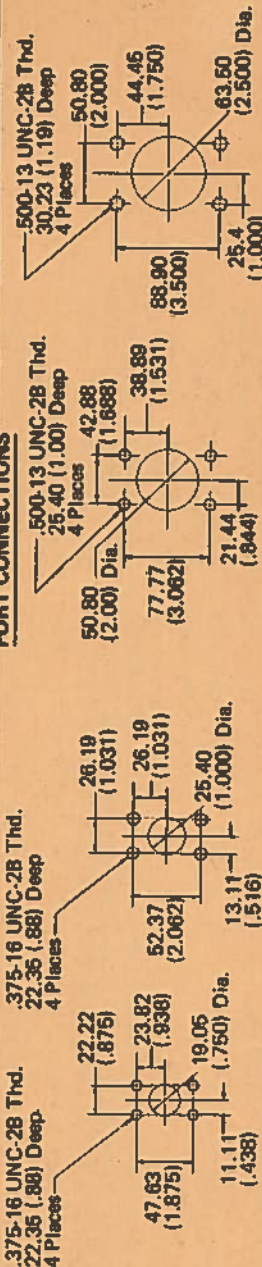
HIGH PERFORMANCE — HIGH EFFICIENCY

MODEL SERIES G2020-30 DESIGN FIXED DISPLACEMENT —  
GEAR TYPE FOR USE WITH OIL, SYNTHETIC, AND  
WATER-IN-OIL EMULSION FIRE RESISTANT FLUIDS

Dimensions Shown in  
Millimeters (Inches)



## PORT CONNECTIONS



Model	Nominal Delivery @ 1200 RPM LPM (GPM)	Theoretical Displacement Per Rev. mL (Cu. In.)	Rated Speed (RPM)	Rated Pressure bar (PSI)	Min. Speed @ Rated Pressure RPM	Shaft End Pump Weight (Approx.) kg (Lbs.)	Cover End Pump Weight (Approx.) kg (Lbs.)	"A" mm (inch)	"B" mm (inch)	"C" mm (inch)	"D" mm (inch)
G2020-2***7***30	26.5 (7)	23 (1.40)	1800	172 (2500)	1200	13.7 (30.4)	9.7 (21.4)	135.4 (5.33)	117.6 (4.63)	151.6 (5.97)	188.5 (7.43)
G2020-2***9***30	34.0 (9)	29 (1.79)	1800	172 (2500)	1000	14.1 (31.3)	10.2 (22.5)	140.0 (5.51)	122.2 (4.81)	156.2 (6.15)	173.0 (6.81)
G2020-2***11***30	41.5 (11)	36 (2.17)	1800	172 (2500)	900	14.4 (31.8)	10.2 (22.5)	144.5 (5.69)	125.8 (4.95)	160.8 (6.33)	177.5 (6.99)
G2020-2***13***30	49.0 (13)	43 (2.60)	1800	172 (2500)	800	14.8 (32.6)	10.5 (23.2)	149.4 (5.88)	131.6 (5.18)	165.8 (6.52)	182.3 (7.18)
G2020-2***15***30	57.0 (15)	48 (2.94)	1800	172 (2500)	800	15.1 (33.4)	10.7 (23.6)	153.4 (6.04)	135.6 (5.34)	169.7 (6.68)	186.4 (7.34)
G2020-2***17***30	64.5 (17)	55 (3.33)	1800	172 (2500)	800	15.4 (34.0)	11.0 (24.3)	157.7 (6.21)	140.0 (5.51)	174.0 (6.85)	190.9 (7.51)
G2020-2***19***30	72.0 (19)	62 (3.76)	1800	172 (2500)	800	15.8 (34.8)	11.2 (24.8)	162.8 (6.41)	145.0 (5.71)	179.1 (7.05)	195.9 (7.71)
G2020-2***21***30	79.5 (21)	68 (4.12)	1800	172 (2500)	800	16.1 (35.6)	11.5 (25.3)	167.1 (6.58)	149.4 (5.88)	183.4 (7.22)	200.1 (7.88)
G2020-2***23***30	87.0 (23)	74 (4.47)	1800	172 (2500)	800	16.5 (36.5)	11.9 (26.2)	174.0 (6.85)	156.2 (6.15)	190.2 (7.49)	206.9 (8.15)
G2020-2***25***30	94.0 (25)	81 (4.91)	1800	172 (2500)	800	16.9 (37.3)	12.3 (27.0)	180.8 (7.12)	163.1 (6.42)	197.1 (7.76)	213.8 (8.42)

For complete model description refer to model code.

For total weight of double pump combination, combine the appropriate size weight.

The minimum rated speed of a double pump combination is limited to the unit having the higher minimum rated speed of any combination of models.

RELEASED 12-1-78

506300



**General Data**

Sperry Vickers model G2020 series double pumps are high performance, high efficiency external spur gear, fixed displacement design.

Filtration (Mandatory)..... 25 Micron or Less

**Shaft Rotation**

Pumps are normally assembled for right hand (clockwise) rotation as viewed from the shaft end. If left hand (counterclockwise) rotation is required, specify by adding the symbol "L" to the model number.

Example: G2020-2E17B7A-21A-30L

**Port Connections**

Pumps have a common inlet; outlet ports are located in the covers of the pump. Either SAE 4-bolt flange or SAE straight thread ports are standard.

**Pump Drive**

Pump is recommended for direct coaxial drive. If drives imposing radial shaft loads are considered, please consult your local Sperry Vickers Representative.

**Ratings**

Maximum and Minimum Speeds (RPM)..... See Chart  
Maximum Pressure (PSI)..... See Chart

**Air Bleed**

At time of first starting, if pump does not prime immediately, air should be bled from pump delivery line. This may be accomplished by loosening a connection in the delivery line close to the pump until oil flows, indicating pump has primed. An airbleed valve is available for this purpose. See drawing 521801.

**Inlet Conditions**

Pressure on inlet should not exceed 15 PSI. Under continuous operation, the inlet vacuum should not exceed 5 inches of mercury.

**Fluids and Temperature Data**

Petroleum Oils - Use antiwear industrial hydraulic oils or automotive crankcase oils having letter designations SC, SD or SE.

Running viscosity range 70 to 250 SUS. Operating Temperature 120°F. recommended, 150°F. usual maximum.

For details refer to data sheet 1-286-S for hydraulic fluid and temperature recommendations.

Water-in-oil Emulsion may be used, however, they require careful selection and monitoring of the fluid. For assistance, contact your local Sperry Vickers Representative. Soluble-oil-in-water solutions are not recommended.

Synthetic Fire Resistant Fluids - Phosphate esters and their blends with operating viscosity of the petroleum oil described above. These fluids are generally compatible with fluorocarbon and silicone elastomers. Add prefix "F3" to the model number.

**Ordering Instructions**

Select pumps according to the typical model code shown. Available standard options are listed in this code.

**Electric Motor Pumps**

Many motor manufacturers are prepared to furnish drip proof or totally enclosed motors with end bells on which these pumps can be mounted.

Model Code F3 · G2020 · 2E 17 B 7 A · 21 A 30 L · \*\*\*

**Special Seals**

(Omit If Not Required)

**See Fluids Note****Gear Pump****Shaft End Pump****Series Designation****Cover End Pump****Series Designation****Mounting**

2 - SAE "B"

2-Bolt Flange

Common Inlet Port Connections

E - 2.00 Dia. 4-Bolt Flange

F - 2.50 Dia. 4-Bolt Flange

Capacity - Shaft End Pump

SAE Rating (1200 RPM - 100 PSI)

7 - 7 GPM 17 - 17 GPM

9 - 9 GPM 19 - 19 GPM

11 - 11 GPM 21 - 21 GPM

13 - 13 GPM 24 - 24 GPM

15 - 15 GPM 27 - 27 GPM

Shaft End Pump

Outlet Port Connections

A - .75 Dia. - 4-Bolt Flange

B - 1.00 Dia. - 4-Bolt Flange

T - 1.0625-12 Straight Thread

S - .875-12 Straight Thread

V - 1.3125-12 Straight Thread

**Special Features Suffix**

Rotation Viewed From Shaft End

L - Counterclockwise

- Omit For Clockwise

**Design and Modification**

1 - 1st Design

0 - No Modification

**Shaft Seal**

A - Single

B - Double

**Shafts**

21 - Straight Keyed (SAE "B-B")

Cover End Pump Outlet Port

Connections

A - .75 Dia. - 4-Bolt Flange

B - 1.00 Dia. - 4-Bolt Flange

S - .875-12 Straight Thread

T - 1.0625-12 Straight Thread

V - 1.3125-12 Straight Thread

Capacity - Cover End Pump

SAE Rating (1200 RPM - 100 PSI)

7 - 7 GPM 17 - 17 GPM

9 - 9 GPM 19 - 19 GPM

11 - 11 GPM 21 - 21 GPM

13 - 13 GPM 24 - 24 GPM

15 - 15 GPM 27 - 27 GPM

**FOOT MOUNTING**

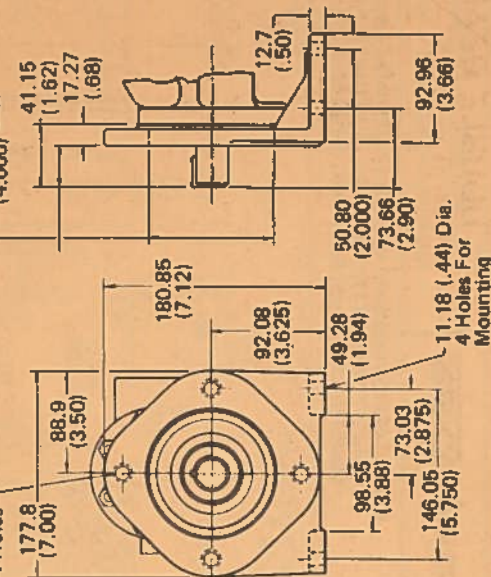
Note: Foot mounting must be ordered separately.

Example: One (1) G20-2D1381-A1D-30 Pump

One (1) FB-8-10 Foot Bracket Kit

1/2-13 UNC-2B Thd.

4 Holes



506300-1



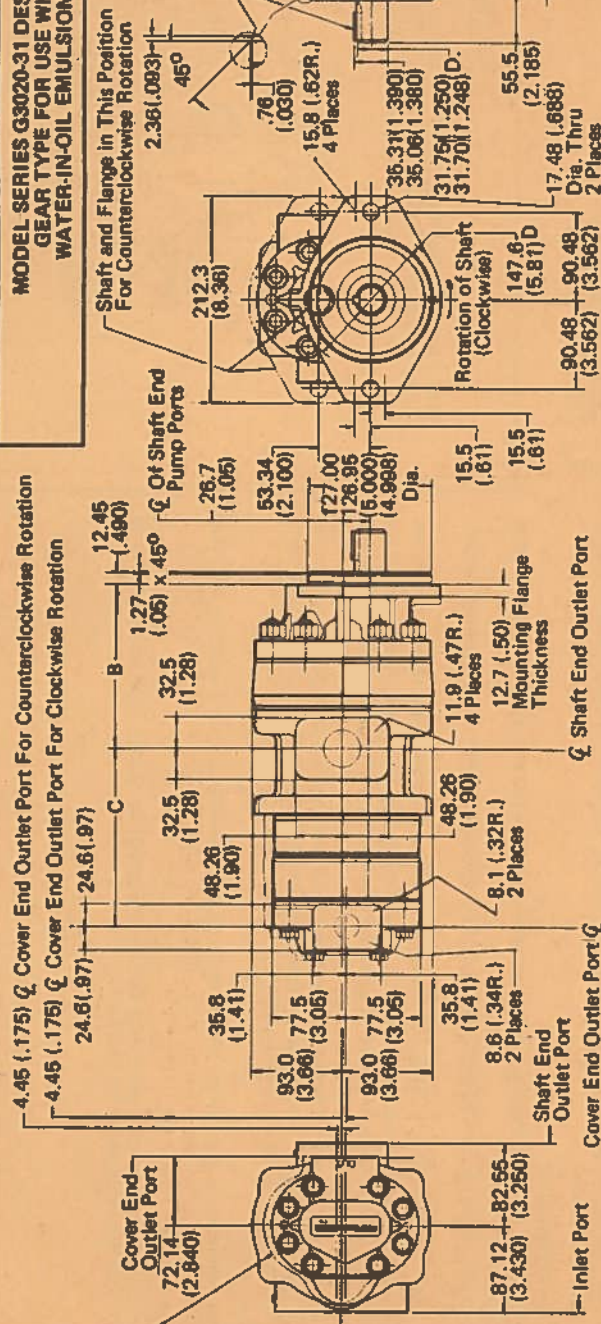
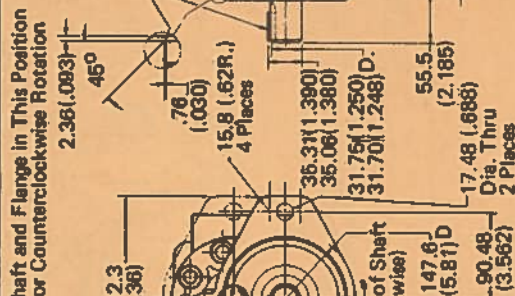
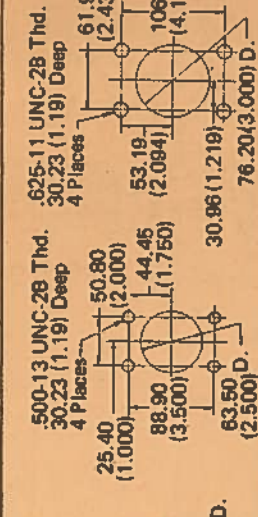
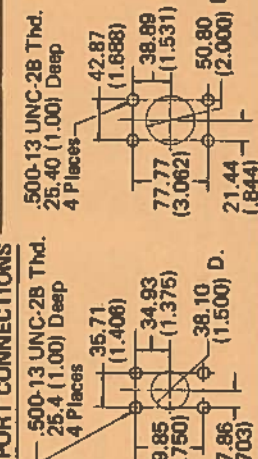
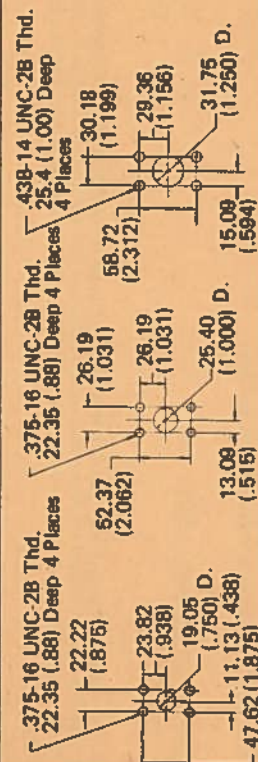
**SPERRY-VICKERS**  
 TROY, MICHIGAN 48064

**DOUBLE  
GEAR  
PUMPS**
**FIXED  
DISPLACEMENT**
**RATED CAPACITIES  
FROM 7.27 GPM &  
18-50 GPM  
@ 1200 RPM & 100 PSI**
**2-BOLT FLANGE  
OR  
FOOT MOUNTING**
**DWG. NO.  
506400**

b-75

 Dimensions Shown In  
 Millimeters (Inches)

**DOUBLE GEAR PUMPS**  
 HIGH PERFORMANCE — HIGH EFFICIENCY

 — Cover End Pump In This Position For Counterclockwise Rotation  
 — 4.45 (.175) Q Cover End Outlet Port For Counterclockwise Rotation  
 — 4.45 (.175) Q Cover End Outlet Port For Clockwise Rotation

**MODEL SERIES G3020-31 DESIGN FIXED DISPLACEMENT —  
GEAR TYPE FOR USE WITH OIL, SYNTHETIC, AND  
WATER-IN-OIL EMULSION FIRE RESISTANT FLUIDS**

**PORT CONNECTIONS**


Shift End Pump (G30)										Cover End Pump (G20)							
Model	Nominal Delivery @ 1200 RPM LPM (GPM)	Theo. Disp. Per Rev. mL (Cu. In.)	Rated Pressure bar (PSI)	Min. Speed @ Rated Pressure RPM	Weight (Approx.) kg (Lbs.)	"A" mm (Inch)	"B" mm (Inch)	Model	Nominal Delivery @ 1200 RPM LPM (GPM)	Theo. Disp. Per Rev. mL (Cu. In.)	Rated Pressure bar (PSI)	Min. Speed @ Rated Pressure RPM	Weight (Approx.) kg (Lbs.)	"C" mm (Inch)	"D" mm (Inch)		
G3020-18*	68.13 (18)	58 (3.54)	172 (2500)	800	23.3 (51.3)	195.0 (6.50)	151.4 (5.96)	G3020-13 UNC-28 Thd. 30.23 (1.19) Deep 4 Places	28.50 (1.10) Deep 4 Places	23 (1.40)	172 (2500)	800	9.7 (21.4)	157.0 (6.18)	178.1 (7.01)		
G3020-22*	79.49 (21)	68 (4.12)			23.7 (52.3)	193.7 (6.88)	155.2 (6.15)	G3020-11 UNC-28 Thd. 30.23 (1.19) Deep 4 Places	25.40 (1.00) Deep 4 Places	25.40 (1.00) Deep 4 Places			25.40 (1.00) Deep 4 Places	10.0 (22.0)	161.5 (6.36)	182.6 (7.19)	
G3020-25*	94.63 (25)	80 (4.91)			24.4 (53.8)	176.0 (6.93)	162.3 (6.39)	G3020-10 UNC-28 Thd. 30.23 (1.19) Deep 4 Places	25.40 (1.00) Deep 4 Places	25.40 (1.00) Deep 4 Places			25.40 (1.00) Deep 4 Places	900	10.2 (22.5)	166.1 (6.54)	186.9 (7.36)
G3020-30*	113.55 (30)	97 (5.89)			25.2 (55.5)	183.8 (7.24)	170.2 (6.70)	G3020-9 UNC-28 Thd. 30.23 (1.19) Deep 4 Places	25.40 (1.00) Deep 4 Places	25.40 (1.00) Deep 4 Places			25.40 (1.00) Deep 4 Places	800	10.5 (23.2)	170.9 (6.73)	191.8 (7.55)
G3020-35*	132.48 (35)	113 (6.87)	155 (2250)	800	26.0 (57.2)	191.7 (7.55)	178.1 (7.01)	G3020-8 UNC-28 Thd. 30.23 (1.19) Deep 4 Places	56.78 (15)	48 (2.94)	155 (2250)	800	10.7 (23.6)	175.0 (6.89)	195.8 (7.71)		
G3020-40*	151.40 (40)	129 (7.86)	155 (2250)		26.7 (58.8)	199.5 (7.86)	185.9 (7.32)	G3020-7 UNC-28 Thd. 30.23 (1.19) Deep 4 Places	64.35 (17)	55 (3.33)			11.0 (24.3)	179.3 (7.06)	200.4 (7.89)		
G3020-45*	170.33 (45)	145 (8.84)	138 (2000)		27.5 (60.7)	207.4 (8.17)	193.8 (7.63)	G3020-6 UNC-28 Thd. 30.23 (1.19) Deep 4 Places	71.93 (19)	62 (3.78)			11.3 (24.8)	184.4 (7.28)	205.5 (8.09)		
G3020-50*	189.25 (50)	161 (9.82)	124 (1800)		28.3 (62.4)	215.2 (8.47)	201.7 (7.94)	G3020-5 UNC-28 Thd. 30.23 (1.19) Deep 4 Places	79.49 (21)	68 (4.12)			11.5 (25.3)	188.7 (7.43)	209.6 (8.25)		
● For complete model description refer to model code.																	
■ For total weight of the double pump combination, combine the appropriate G20 & G30 size weights.																	

\* For complete model description refer to model code.

\*\* For total weight of the double pump combination, combine the appropriate G20 &amp; G30 size weights.

\*\*\* The minimum rated speed of the pump is limited to the unit having the higher minimum rated speed of any combination of models.

RELEASED 12-1-76

506-400



General Data

Sperry Vickers model G3020 series double pumps are high performance, high efficiency external spur gear, fixed displacement design.

Filtration (Mandatory)..... 25 Micron or Less

Shaft Rotation

Pumps are normally assembled for right hand (clockwise) rotation as viewed from the shaft end. If left hand (counterclockwise) rotation is required, specify by adding the symbol "L" to the model number.

Example: G3020-7E18B7A-1A31L

Port Connections

Pumps have a common inlet; outlet ports are located in the covers of the pump. Either SAE 4-bolt flange or SAE straight thread ports are standard.

Pump Drive

Pump is recommended for direct coaxial drive. If drives imposing radial shaft loads are considered, please consult your local Sperry Vickers Representative.

Ratings

Maximum and Minimum Speeds (RPM)..... See Chart

Maximum Pressure (PSI)..... See Chart

Air Bleed

At time of first starting, if pump does not prime immediately, air should be bled from pump delivery line. This may be accomplished by loosening a connection in the delivery line close to the pump until oil flows, indicating pump has primed. An airbleed valve is available for this purpose. See drawing 521801.

Inlet Conditions

Pressure on inlet should not exceed 15 PSI. Under continuous operation, the inlet vacuum should not exceed 5 inches of mercury.

Fluids and Temperature Data

Petroleum Oils - Use antiwear industrial hydraulic oils or automotive crankcase oils having letter designations SC, SD or SE.

Running viscosity range 70 to 250 SUS. Operating temperature 120°F. recommended, 150°F. usual maximum.

For details refer to data sheet I-286-S for hydraulic fluid and temperature recommendations. Water-in-oil Emulsion may be used, however, they require careful selection and monitoring of the fluid. For assistance, contact your local Sperry Vickers Representative. Soluble-oil-in-water solutions are not recommended.

Synthetic Fire Resistant Fluids - Phosphate esters and their blends with operating viscosity of the petroleum oil described above. These fluids are generally compatible with fluorocarbon and silicone elastomers. Add prefix "F3" to the model number.

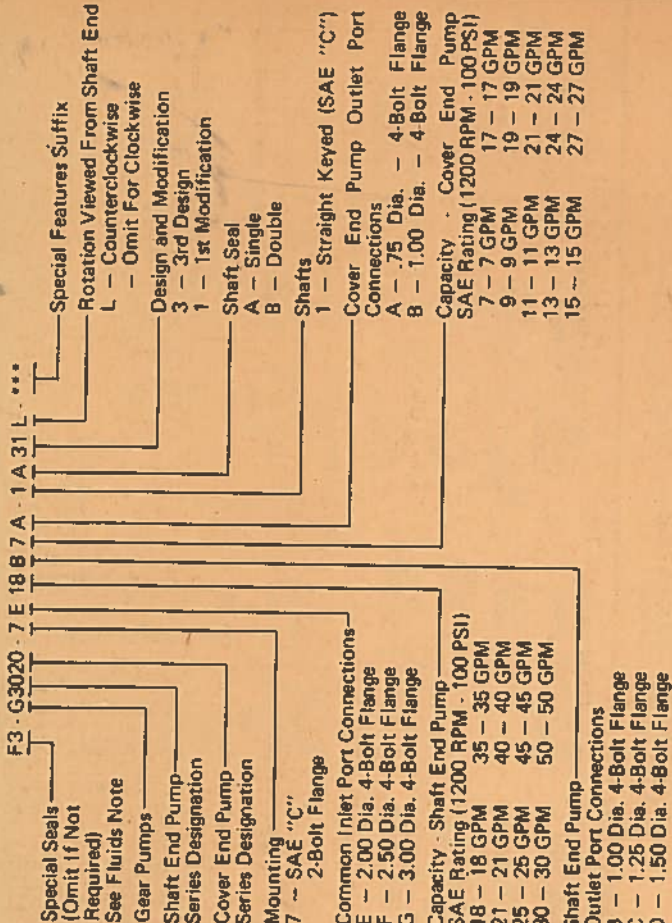
Ordering Instructions

Select pumps according to the typical model code shown. Available standard options are listed in this code.

Electric Motor Pumps

Many motor manufacturers are prepared to furnish drip proof or totally enclosed motors with end bells on which these pumps can be mounted.

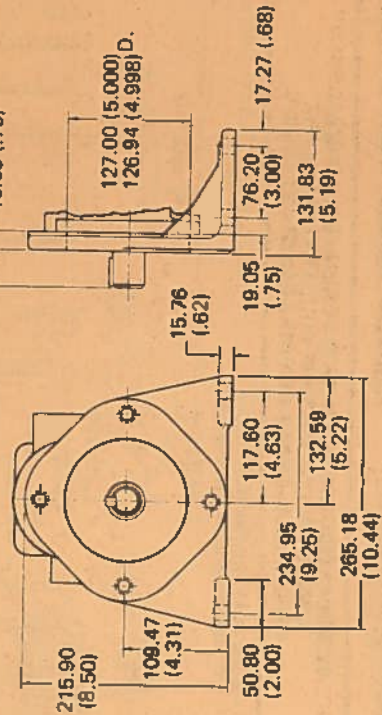
Model Code



FOOT MOUNTING

Note: Foot Mounting must be ordered separately.

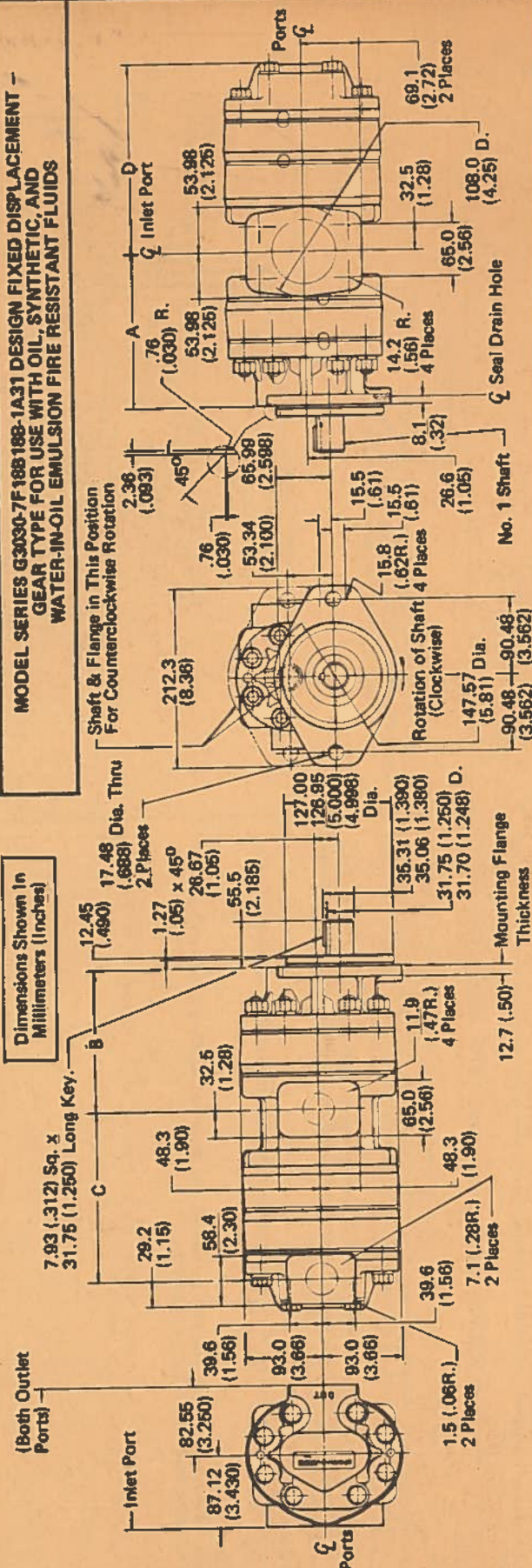
Example: One (1) G3020-7E18B7A-1A31 Pump  
One (1) FB-C-10 Foot Bracket Kit



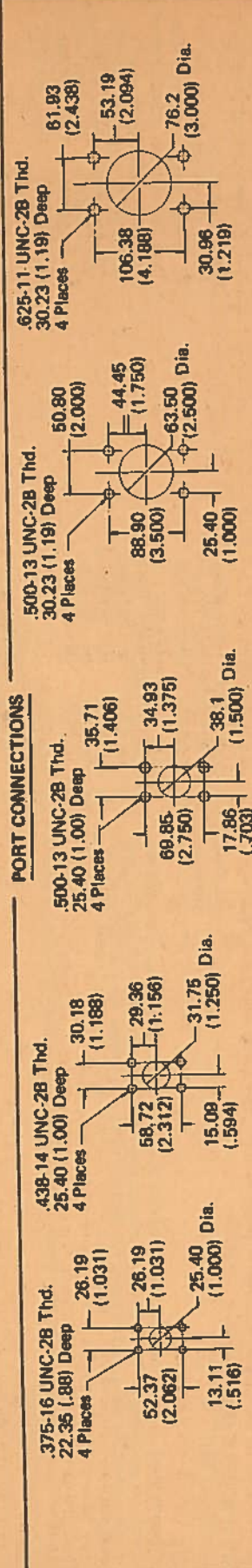


## DOUBLE GEAR PUMPS

**MODEL SERIES G3030-7F188188-1A31 DESIGN FIXED DISPLACEMENT -  
GEAR TYPE FOR USE WITH OIL, SYNTHETIC, AND  
WATER-IN-OIL EMULSION FIRE RESISTANT FLUIDS**



## PORT CONNECTIONS



- For complete model description refer to model code.
- For total weight of double pump combination, combine the appropriate size weight.

Model	Maximal Delivery @ 1200 RPM LPM	Theoretical Displacement Per Rev. mL (Cu. In.)	Rated Speed (RPM)	Rated Pressure bar (PSI)	Min. Speed @ Rated Pressure RPM	Shaft End Weight (Approx.) kg (Lbs.)	Cover End Weight (Approx.) kg (Lbs.)	"A" mm (inch)	"B" mm (inch)	"C" mm (inch)	"D" mm (inch)
63030-7*18*18***31	68.13 (18)	58 (3.54)				23.72 (51.3)	16.32 (36.0)	165.0 (6.50)	151.4 (5.96)	182.6 (7.19)	205.0 (8.07)
63030-7*21*21***31	79.49 (21)	68 (4.12)				23.72 (52.3)	16.72 (36.8)	169.7 (6.68)	156.2 (6.15)	187.2 (7.37)	209.7 (8.26)
63030-7*25*25***31	94.63 (25)	80 (4.91)				24.40 (53.8)	17.24 (38.0)	175.0 (6.93)	162.3 (6.39)	193.3 (7.61)	216.9 (8.50)
63030-7*30*30***31	113.55 (30)	97 (5.89)	1800	172 (2500)	800	25.17 (55.6)	17.9 (39.6)	183.8 (7.24)	170.2 (6.70)	201.4 (7.93)	223.9 (8.81)
63030-7*35*35***31	132.48 (35)	113 (6.87)				25.95 (57.2)	18.6 (41.2)	191.7 (7.55)	178.1 (7.01)	209.3 (8.24)	231.7 (9.12)
63030-7*40*40***31	151.40 (40)	129 (7.86)		155 (2250)		26.67 (58.8)	19.4 (42.7)	199.5 (7.86)	185.9 (7.32)	217.2 (8.55)	239.6 (9.43)
63030-7*45*45***31	170.33 (45)	145 (8.84)		133 (2000)		27.53 (60.7)	20.0 (44.3)	207.4 (8.17)	193.8 (7.63)	225.0 (8.86)	247.4 (9.74)
63030-7*50*50***31	189.25 (50)	161 (9.82)		124 (1800)		28.30 (62.4)	20.7 (45.7)	215.2 (8.47)	201.7 (7.94)	232.9 (9.17)	255.3 (10.05)

506500

RELEASED 12-1-78



**General Data**

Sperry Vickers model G3030 series double pumps are high performance, high efficiency external spur gear, fixed displacement design.

Filtration (Mandatory)..... 25 Micron or Less

**Shaft Rotation**

Pumps are normally assembled for right hand (clockwise) rotation as viewed from the shaft end. If left hand (counterclockwise) rotation is required, specify by adding the symbol "L" to the model number.

Example: G3030-7F18B18B-1A31L

**Port Connections**

Pumps have a common inlet; outlet ports are located in the covers of the pump. Either SAE 4-bolt flange or SAE straight thread ports are standard.

**Pump Drive**

Pump is recommended for direct coaxial drive. If drives imposing radial shaft loads are considered, please consult your local Sperry Vickers Representative.

**Ratings**

Maximum and Minimum Speeds (RPM)..... See Chart

Maximum Pressure (PSI)..... See Chart

**Air Bleed**

At time of first starting, if pump does not prime immediately, air should be bled from pump delivery line. This may be accomplished by loosening a connection in the delivery line close to the pump until oil flows, indicating pump has primed. An air bleed valve is available for this purpose. See drawing 521601.

**Inlet Conditions**

Pressure on inlet should not exceed 15 PSI. Under continuous operation, the inlet vacuum should not exceed 5 inches of mercury.

**Fluids and Temperature Data**

Petroleum Oils - Use antiwear industrial hydraulic oils or automotive crankcase oils having letter designations SC, SD or SE.

Running viscosity range 70 to 250 SUS. Operating temperature 120°F. recommended, 150°F. usual maximum.

For details refer to data sheet I-286-S for hydraulic fluid and temperature recommendations. Water-in-oil Emulsion may be used, however, they require careful selection and monitoring of the fluid. For assistance, contact your local Sperry Vickers Representative. Soluble-oil-in-water solutions are not recommended.

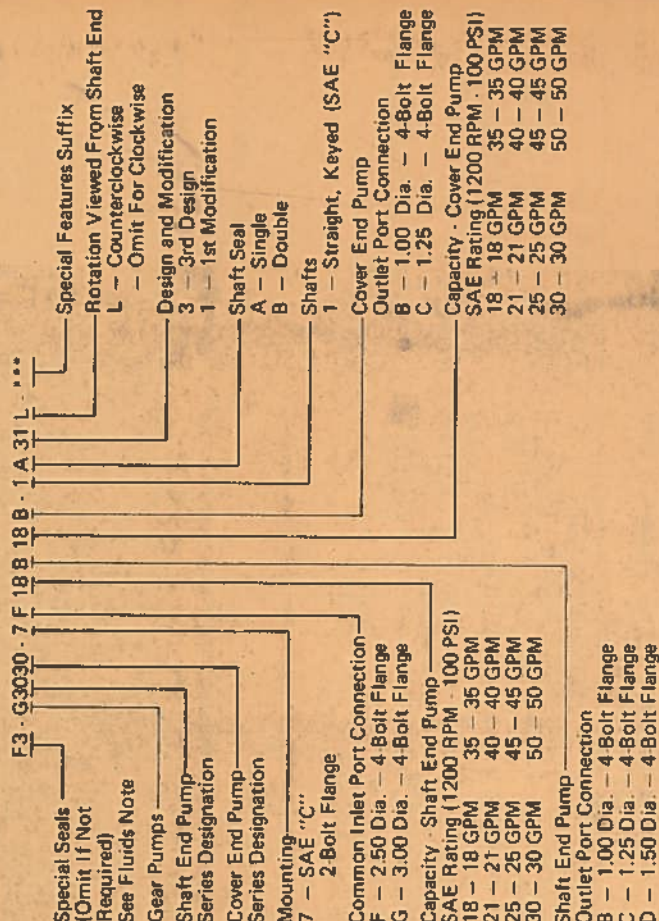
Synthetic Fire Resistant Fluids - Phosphate esters and their blends with operating viscosity of the petroleum oil described above. These fluids are generally compatible with fluorocarbon and silicone elastomers. Add prefix "F3" to the model number.

**Ordering Instructions**

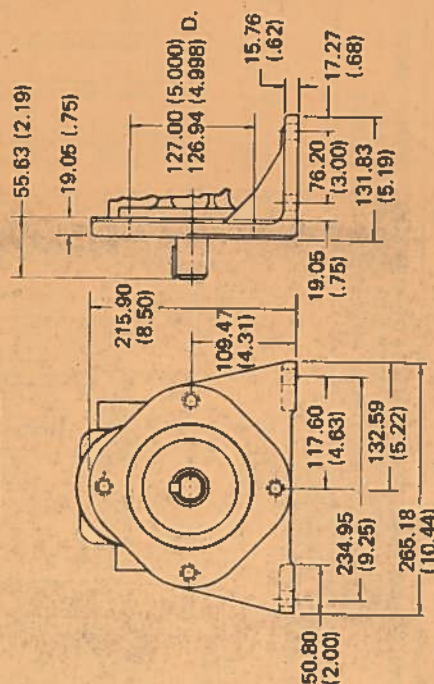
Select pumps according to the typical model code shown. Available standard options are listed in this code.

**Electric Motor Pumps**

Many motor manufacturers are prepared to furnish drip proof or totally enclosed motors with end bells on which these pumps can be mounted.

**Model Code****FOOT MOUNTING**

Note: Foot mounting must be ordered separately.  
Example: One (1) G3030-7F18B18B-1A31 Pump  
One (1) FB-C-10 Foot Bracket Kit





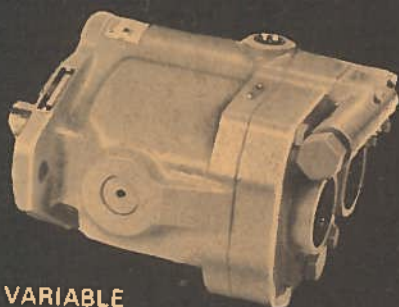
# PISTON PUMPS

Extensive use of powdered metallurgy and other advanced manufacturing techniques permits Sperry Vickers to offer in-line series piston pumps at substantial weight and cost reductions to you. Whether fixed or variable displacement, these pumps feature high volumetric efficiency and a pressure range of 1000 to 5000 psi.

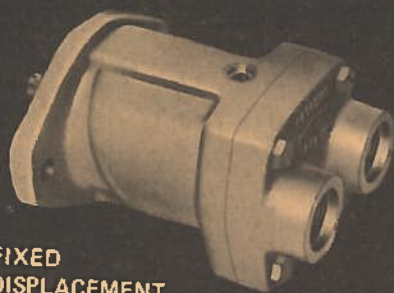




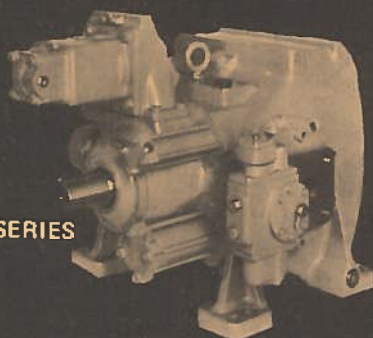
**PFA SERIES**



**VARIABLE  
DISPLACEMENT**



**FIXED  
DISPLACEMENT**



**PVA SERIES**

## **FEATURES**

Highest over-all operating efficiency.  
Smoother and more uniform power output with multi-cylinder design.  
High delivery ratio for size of unit.  
Choice of rotation.  
Continuous duty.

## **VALVE LOAD LIMITED BY HYDRAULIC BALANCE**

Hydraulic balancing is utilized to limit the loading of the cylinder block on the face of the ball race steel valve plate. The small differential in the area of these two contacting faces limits the thrust in unit pressure to an absolute minimum.

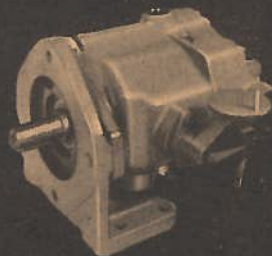
## **WIDE RANGE AVAILABLE**

Fixed angle piston pumps are also available for a maximum delivery of 180 GPM and pressures up to 5,000 psi. These pumps have the highest overall efficiency in the industry, with smooth operation because of their multi-cylinder design.

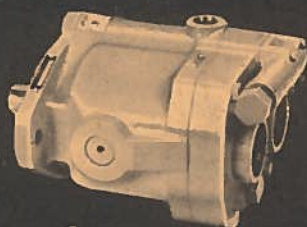
## **PRESSURE COMPENSATOR CONTROL**

All variable displacement pumps are available with pressure compensator control that automatically adjusts pump delivery to meet system needs. Maximum pump delivery is maintained until pressure is approximately 50 psi below compensator setting. At this point compensator reduces output flow of pump to maintain preset pressure, reducing input horsepower.

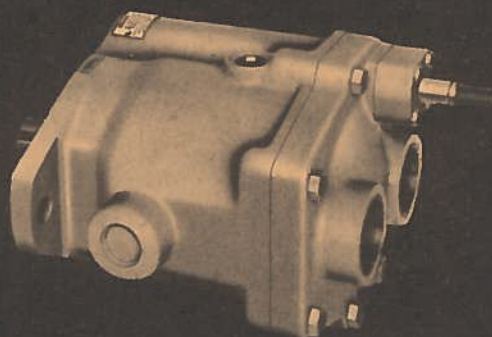




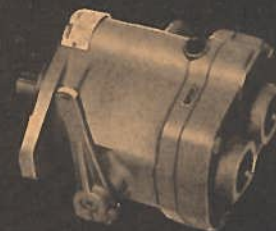
Handwheel



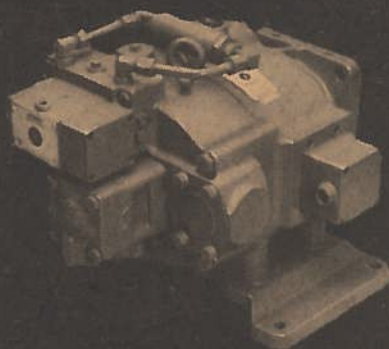
Pressure  
Compensator



Stem Servo



Lever



Electro-Hydraulic  
Servo Control

**Variety of Controls...**



# INDEX SECTION C - PISTON PUMPS

DESCRIPTION	NOMINAL GPM	DWG. NO.	PAGE NO.
INLINE PISTON UNIT LIFE AND FLUID DATA		507000	c - 1
INDIRECT DRIVE DATA		507010	c - 2
FIXED DISPLACEMENT "ANGLE" TYPE	1200 RPM		
PFA50/150	40 to 150	508100	c - 6
FIXED DISPLACEMENT "INLINE" TYPE	1800 RPM		
PFB-5	5	507725	c - 9
PFB-10	10	507727	c - 11
PFB-20	20	507729	c - 13
F6-PFB20/29 Sol. Oil	20	507730	c - 15
PFB-45	45	507800	c - 18
F6-PFB45 Sol. Oil	45	507802	c - 20
PFB-90 All common fluids and Sol. Oil	90	507812	c - 22
VARIABLE DISPLACEMENT "ANGLE" TYPE	1200 RPM		
Control			
PVA120/150 Electro Hydraulic	120 & 150	509300	c - 25
PVA120/150 Hydr-Mechanical	120 & 150	509400	c - 29
PVA120/150 Compensator	120 & 150	509500	c - 33
PVA120/150 Handwheel	120 & 150	509600	c - 36
VARIABLE DISPLACEMENT "INLINE" TYPE	1800 RPM		
Control			
PTR3 Handwheel	5	508200	c - 39
PVB6A Compensator	6	508275A	c - 41
PVB5/6 Compensator, Handwheel & Lever	5 & 6	508300B	c - 43
PVB10/15 Compensator, Handwheel & Lever	10-15	508400A	c - 49
PVB20/29 Compensator	20-29	508500B	c - 55
PVB45A Compensator	45	508880	c - 61
PVB45 Compensator	45	508890	c - 63
PVB45 Stem servo	45	509005	c - 67
PVB45 Step control	45	509010A	c - 70
PVB45 Electro Hydraulic	45	509015	c - 74
PVB90 Compensator	90	509020	c - 78
PVB90 Manual	90	509021	c - 81
PVB90 Stem servo	90	509022	c - 84
PVB90 Electro Hydraulic	90	509025	c - 87
PVB90 Electric Step	90	509030	c - 90

"Relief valve protection is required to limit pump pressure to published ratings. See catalog pressure control section (d). If shock and/or surge pressures exceed the pressure rating by 10%, then other circuit design techniques are required to protect the pump and hydraulic system."

## MODEL CODES

Model codes in this catalog list many options. Some possible model combinations are not readily available. Please contact your Sperry Vickers representative to verify availability.



# SPERRY VICKERS T.M. INLINE PISTON PUMP LIFE AND FLUID DATA

FLUID	MODEL (E)		PRESSURE MAX. PSI	MAXIMUM SPEED				MAX. TEMP. °F.
				NON-PRESSURIZED INLET		PRESSURIZED INLET		
				SPEED	MINIMUM INLET (G)	SPEED	MINIMUM INLET	
Petroleum Base SAE 10W (MS) or Equivalent  (100%) A	Fixed & Variable	5	3000	1800 (J)	5 in. Hg. Vac.	3600	8 PSI	150
		6	2000			3200		
		10	3000			3200		
		15	2000			3000	12 PSI	
		20(H)	● 3000			2400		
		29(H)	2000			2400		
		45 A	1000			1800	7 PSI	
		45(B)	3000			2200		
		90(B)	3000			1800		
		1200	1800			8 PSI		
MIL-H-5606 (100%) A	Fixed & Variable	5	3000(C)	1800	5 in. Hg. Vac.	3600(C)	8 PSI	130
		6	2000(D)			3200(D)		
		10	3000(C)			3200(C)		
		15	2000(D)			3000(D)	12 PSI	
		20(H)	2500(C)			2400(C)		
		29(H)	2000(D)			2400(D)		
		45(B)	3000(C)			2200(C)		
		90(B)	3000(C)			1800	8 PSI	
		1200	1800			8 PSI		
		Synthetics (Phosphate Ester) (75% to 100%) A	Fixed			5, 10	2500	
20, 45	8 PSI							
6, 29	2000			8 PSI				
90(B)	2500					1200		
Variable	5, 10		2000	1800	5 in. Hg. Vac.	1800	5 in. Hg. Vac.	
	20(H), 45(B)						8 PSI	
	6, 15, 29		1500	8 PSI				
	90(B)		2000				1200	
Common Water-Oil Emulsions (70% to 80%) A	Fixed	5, 10	2500	1800	3 in. Hg. Vac.	1800	3 in. Hg. Vac.	130
		20, 45					8 PSI	
		6, 29	2000	8 PSI				
		90	2000				1200	
	Variable	5, 10	2000	1800	3 in. Hg. Vac.	1800	3 in. Hg. Vac.	
		20(H), 45(B)					8 PSI	
		6, 15, 29	1500	8 PSI				
		90(B)	2000				1200	
Water Glycol (40% to 60%) A	Fixed	5, 10	2500	1800	3 in. Hg. Vac.	1800	3 in. Hg. Vac.	130
		20, 45					8 PSI	
		6, 29	2000	8 PSI				
		90	2000				1200	
	Variable	5, 10	2000	1800	3 in. Hg. Vac.	1800	3 in. Hg. Vac.	
		20(H), 45(B)					8 PSI	
		6, 15, 29	1500	8 PSI				
		90(B)	2000				1200	
Water (95%) and Soluble Oil (5%) (50%) A F6 Prefix	Fixed Pumps	10	2000	1800	3 in. Hg. Vac.	2200	3 in. Hg. Vac.	120
		20-29	2000		3 in. Hg. Vac. (F)	1800	3 in. Hg. Vac. (F)	
		45	2000		3 in. Hg. Vac. (F)	1200	3 in. Hg. Vac. (F)	
		90	2000	1200	3 in. Hg. Vac.	1200	3 in. Hg. Vac.	

- (A) - Life Factor (Percent of expected life with petroleum base fluids)  
 (B) - Overcenter Controlled requires 50 PSI Inlet Pressure  
 (C) - For use above 1500 PSI, contact Sperry Vickers Application Engineer  
 (D) - For use above 1000 PSI, contact Sperry Vickers Application Engineer  
 (E) - Flow indicated in model number for Speed of 1800 RPM  
 (F) - 5 in. Hg. Vac. allowable to 1500 RPM Pump Speed  
 (G) - Inlet Vacuum Rating is minimum steady state and minimum transient pressure  
 (H) - Overcenter controlled requires 25 PSIG Inlet Pressure  
 (J) - See inlet curve on catalog installation drawing for specific model.

For further assistance in determining the proper pump and fluid type for your application, please contact the Sperry Vickers Representative in your area.

● Fixed 2500 PSI

REVISED 12-1-78

DATA SHEET 507000



# SPERRY VICKERS INDIRECT DRIVE DATA FOR "B" SERIES INDUSTRIAL INLINE FIXED AND VARIABLE PISTON PUMPS AND MOTORS

The following system is set up to determine the minimum diameter of an indirect drive member allowable on an inline piston pump or motor shaft. You need to know which port is inlet and outlet as you face the ports and the location of the "external" members of the indirect drive system. For spur gear drives, you also need to be concerned with the direction of rotation of the inline piston unit for the inlet and outlet ports used.

A few important conditions apply to this data.

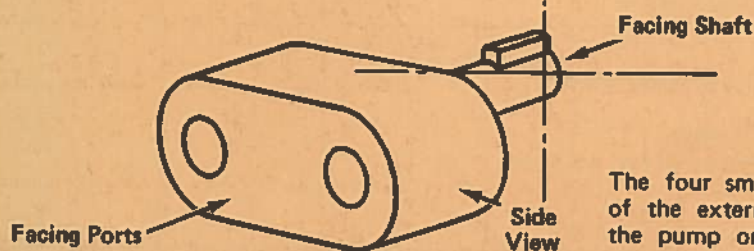
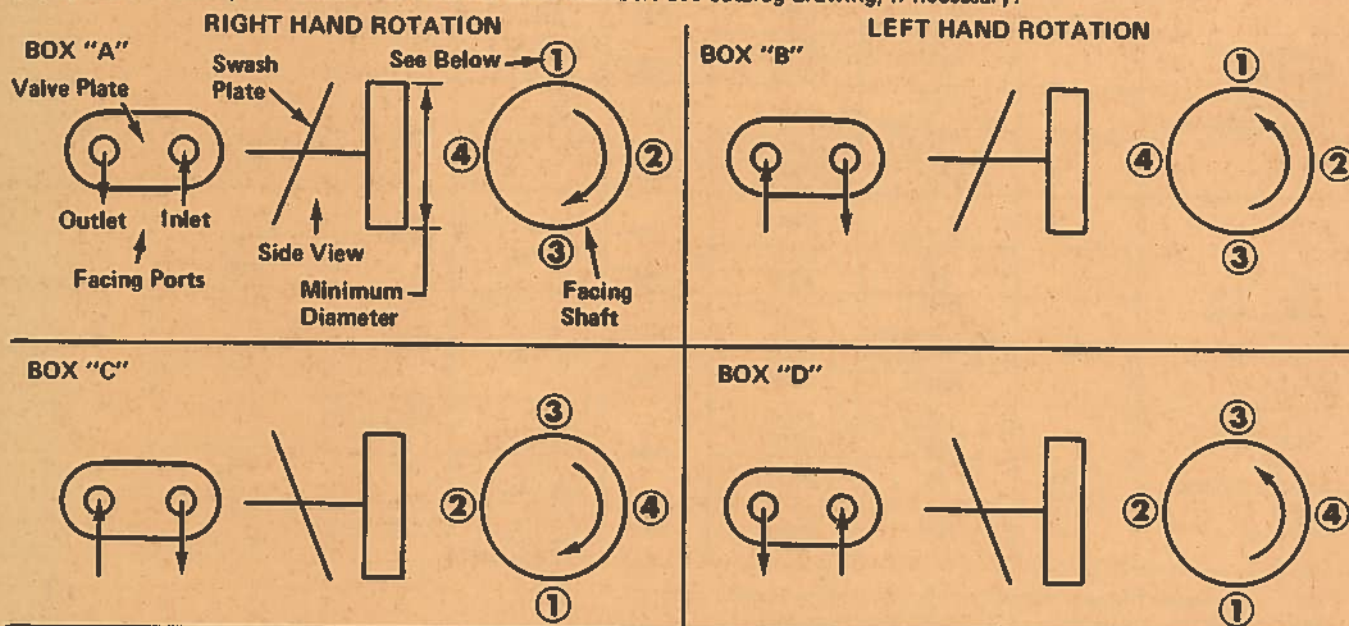
1. Minimum diameters apply for operating conditions of 1800 RPM, 1500 PSI. A few units marked by a ■ are for 1000 PSI.

Any speed or pressure conditions above these require Engineering evaluation to arrive at new allowable diameters and check out the shaft strength. NR = Not Recommended.

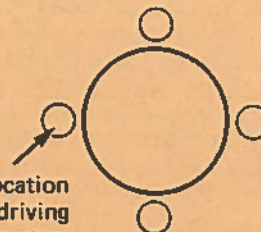
2. The pressure condition applies to the sum of the inlet and outlet pressures.
3. The load is considered applied at the end of the shaft extension for 10,000 hours B10 bearing life.
4. For systems where the inline piston unit yoke crosses center two diameters must be determined and the larger one must be used.
5. See inline piston unit catalog drawing to determine inlet and outlet ports for a given unit position and rotation.
6. The inline piston unit bearing loads due to the chain, timing belt, and V-belt do not change with right or left hand rotation. HOWEVER, THE PROPER INSTALLATION CONDITIONS IN BOXES A, B, C OR D MUST STILL BE SELECTED IN STEP NO. 1.
7. If external load is applied at other than 90° to unit center lines, contact Product Sales Control and Development Support.

## STEP 1 - Find External Drive Member Position Number.

Select installation conditions in Box A, B, C, or D that applies to your inline piston unit application as to inlet and outlet ports, shaft rotation, and location of external drive member. See catalog drawing, if necessary.



The four small circles define the location of the external pulley, gear, etc., driving the pump or being driven by the motor.





**STEP 2 – Find minimum diameter listed.**

Find the number arrived at in step 1 at the top of one of four columns at the right. Read down for the minimum allowable diameter of the indirect drive member on the piston unit.

**FIXED DISPLACEMENT PISTON UNITS**

Model Number	Rotation of Piston Unit Seen From Shaft End. (See Note No. 6)	Type of Drive	Minimum Allowable Diameter Of Indirect Drive Member On Piston Unit Shaft In Inches.			
			Number Arrived At In Step 1			
			①	②	③	④
MFB5-Y-20 PFB5-Y-21	RH or LH	Chain	4.5	2.5	2.5	2.5
		Timing Belt	5	2.5	3	2.5
		V-Belt	6	3	3.5	3
	RH LH	Spur Gear ● Spur Gear ●	2 3	2.5 4	3 2	4 2.5
MFB10-Y-31 PFB10-Y-31	RH or LH	Chain	NR	5	2	5
		Timing Belt	NR	6	2	6
		V-Belt	NR	6.5	2.5	6.5
	RH LH	Spur Gear ● Spur Gear ●	3 7.5	2 NR	7.5 3	NR 2
MFB20-10 PFB20-10	RH or LH	Chain	NR	6.5	2.5	6.5
		Timing Belt	NR	7.5	3	7.5
		V-Belt	NR	9	3.5	9
	RH LH	Spur Gear ● Spur Gear ●	4 10	2.5 NR	10 4	NR 2.5
MFB29-20	RH or LH	Chain	NR	NR	4	NR
		Timing Belt	NR	NR	5	NR
		V-Belt	NR	NR	5.5	NR
	RH LH	Spur Gear Spur Gear	6 NR	4 NR	NR 6	NR 4
PFB45-10	RH or LH	Chain	NR	11	7.5	11
		Timing Belt	NR	13	8.5	13
		V-Belt	NR	15	10	15
	RH LH	Spur Gear Spur Gear	6 NR	7 NR	NR 6	NR 7
MFB45-10	RH or LH	Chain	NR	11.5	5.5	11.5
		Timing Belt	NR	13.5	6.5	13.5
		V-Belt	NR	15.5	7.5	15.5
	RH LH	Spur Gear Spur Gear	6 NR	5 NR	NR 6	NR 5
PFB90-31	RH or LH	Chain	17.5	7	5	7
		Timing Belt	NR	8	6	8
		V-Belt	NR	9.5	7	9.5
	RH LH	Spur Gear Spur Gear	5 9.5	5 16	9.5 5	16 5

**VARIABLE DISPLACEMENT PISTON UNITS**

PVB5-Y-20 MVB5-Y-11	RH or LH	Chain	3.5	2	4	2
		Timing Belt	4	2.5	4.5	2.5
		V-Belt	4.5	2.5	5	2.5
	RH LH	Spur Gear ● Spur Gear ●	2 2.5	3.5 3	2.5 2	3 3.5
■ PVB6-Y-20 1800 RPM 1000 PSI	RH or LH	Chain	2.5	2	2.5	2
		Timing Belt	3	2	2.5	2
		V-Belt	3.5	2.5	3	2.5
	RH LH	Spur Gear ● Spur Gear ●	1.5 2	2 2.5	2 1.5	2.5 2

■ 1000 PSI

● Minimum practical spur gear – 3 inches.

DATA SHEET 507010-1

SEC.

C



# **VARIABLE DISPLACEMENT PISTON UNITS**

Model Number	Rotation of Piston Unit Seen From Shaft End. (See Note No. 6)	Type of Drive	Minimum Allowable Diameter Of Indirect Drive Member On Piston Unit Shaft In Inches.			
			Number Arrived At In Step 1			
			①	②	③	④
PVB10-Y-31 MVB10-Y-31	RH or LH	Chain Timing Belt V-Belt	9 11 12.5	4 4.5 5.5	2 2 2.5	4 4.5 5.5
	RH LH	Spur Gear ● Spur Gear ●	3 5.5	2 8.5	5.5 3	8.5 2
■ PVB15-Y-31 1800 RPM 1000 PSI	RH or LH	Chain Timing Belt V-Belt	10.5 12.5 14.5	4.5 5 6	2 2.5 2.5	4.5 5 6
	RH LH	Spur Gear ● Spur Gear ●	3 6	2 10	6 3	10 2
PVB20-20	RH or LH	Chain Timing Belt V-Belt	13.5 16 NR	5.5 6 7	3 3.5 4	5.5 6 7
	RH LH	Spur Gear Spur Gear	3.5 7.5	3 NR	7.5 3.5	NR 3
■ PVB29-20 1800 RPM 1000 PSI	RH or LH	Chain Timing Belt V-Belt	11.5 13.5 16	5 6 6.5	2.5 3 3.5	5 5.5 6.5
	RH LH	Spur Gear ● Spur Gear ●	3.5 6.5	2.5 NR	6.5 3.5	NR 2.5
■ PVB45A-20 (Not recommended for Indirect Drive)	RH or LH	Chain Timing Belt V-Belt				
	RH LH	Spur Gear Spur Gear				
PVB45-20	RH or LH	Chain Timing Belt V-Belt	NR NR NR	8 9.5 11	7.5 9 10.5	8 9.5 11
	RH LH	Spur Gear Spur Gear	5 NR	7 NR	NR 5	NR 7
PVB45-20-C-11	RH or LH	Chain Timing Belt V-Belt	NR NR NR	8.5 10 11.5	7 8.5 9.5	8.5 10 11.5
	RH LH	Spur Gear Spur Gear	5 NR	6.5 NR	NR 5	NR 6.5
PVB45-*DF-20DA-30 PVB45-*DF-20SA-30	RH or LH	Chain Timing Belt V-Belt	NR NR NR	8.5 10 11.5	8 9.5 11	8.5 10 11.5
	RH LH	Spur Gear Spur Gear	5.5 NR	7.5 NR	NR 5.5	NR 7.5
PVB45-*DF-20DAA-30 PVB45-*DF-20SAA-30	RH or LH	Chain Timing Belt V-Belt	NR NR NR	10.5 12.5 14	10 11.5 13.5	10.5 12.5 14
	RH LH	Spur Gear Spur Gear	6.5 NR	9 NR	NR 6.5	NR 9
PVB45-*SF-20RA-10 PVB45-*DF-20RA-10	RH or LH	Chain Timing Belt V-Belt	NR NR NR	8.5 10 11.5	8 9.5 11	8.5 10 11.5
	RH LH	Spur Gear Spur Gear	5.5 NR	7.5 NR	NR 5.5	NR 7.5

■ 1000 PSI

● Minimum practical spur gear — 3 inches.

DATA SHEET 507010-2



# VARIABLE DISPLACEMENT PISTON UNITS

Model Number	Rotation of Piston Unit Seen From Shaft End. (See Note No. 6)	Type of Drive	Minimum Allowable Diameter Of Indirect Drive Member On Piston Unit Shaft In Inches.			
			Number Arrived At in Step 1			
			①	②	③	④
PVB45-*SF-20-RAA-10 PVB45-*DF-20-RAA-10	RH or LH	Chain Timing Belt V-Belt	NR NR NR	10.5 12.5 14.5	10 11.5 13.5	10.5 12.5 14.5
	RH LH	Spur Gear Spur Gear	6.5 16	9 NR	16 6.5	NR 9
PVB90-20 PVB90-20-C-11	RH or LH	Chain Timing Belt V-Belt	10.5 12.5 14.5	5.5 6.5 7.5	8.5 10 11.5	5.5 6.5 7.5
	RH LH	Spur Gear Spur Gear	5 7	8 10	7 5	10 8
PVB90-*DF-21DA-11	RH or LH	Chain Timing Belt V-Belt	11.5 13.5 15.5	6 7 8	9.5 11 12.5	6 7 8
	RH LH	Spur Gear Spur Gear	5 7.5	8.5 11	7.5 5	11 8.5
PVB90-*DF-30RA-20 PVB90-*DF-30SA-30	RH or LH	Chain Timing Belt V-Belt	11 13 14.5	5.5 6.5 7.5	9 10 12	5.5 6.5 7.5
	RH LH	Spur Gear Spur Gear	5 7	8 10	7 5	10 8
PVB90-*DF-30RAA-20 PVB90-*DF-30SAA-30	RH or LH	Chain Timing Belt V-Belt	11 13 15	5.5 6.5 7.5	9 10.5 12	5.5 6.5 7.5
	RH LH	Spur Gear Spur Gear	5 7	8 10	7 5	10 8

## EXAMPLES:

1. MFB10-Y-31 Motor. Right hand rotation facing shaft, external drive member directly above MFB-10-31-Y. 1800 RPM, 1500 PSI, Spur gear drive.

Step 1. From catalog drawing 520305 facing ports, the inlet is on the right for right hand rotation which conforms to the conditions in Box "A". Since the external drive member is above the MFB-10-31Y, this is position No. 1 in Box "A".

Step 2. In the minimum diameter chart for No. 1 location of the external drive member, and model MFB-10-31Y, read for a right hand spur gear drive, that the minimum diameter spur gear allowable on the MFB10 shaft is 3 inches.

2. PVB45-LDF-20-DAA-30 Pump. Both sides of center pumping, left hand rotation facing shaft, external drive member below the pump. 1800 RPM, 1500 PSI chain drive.

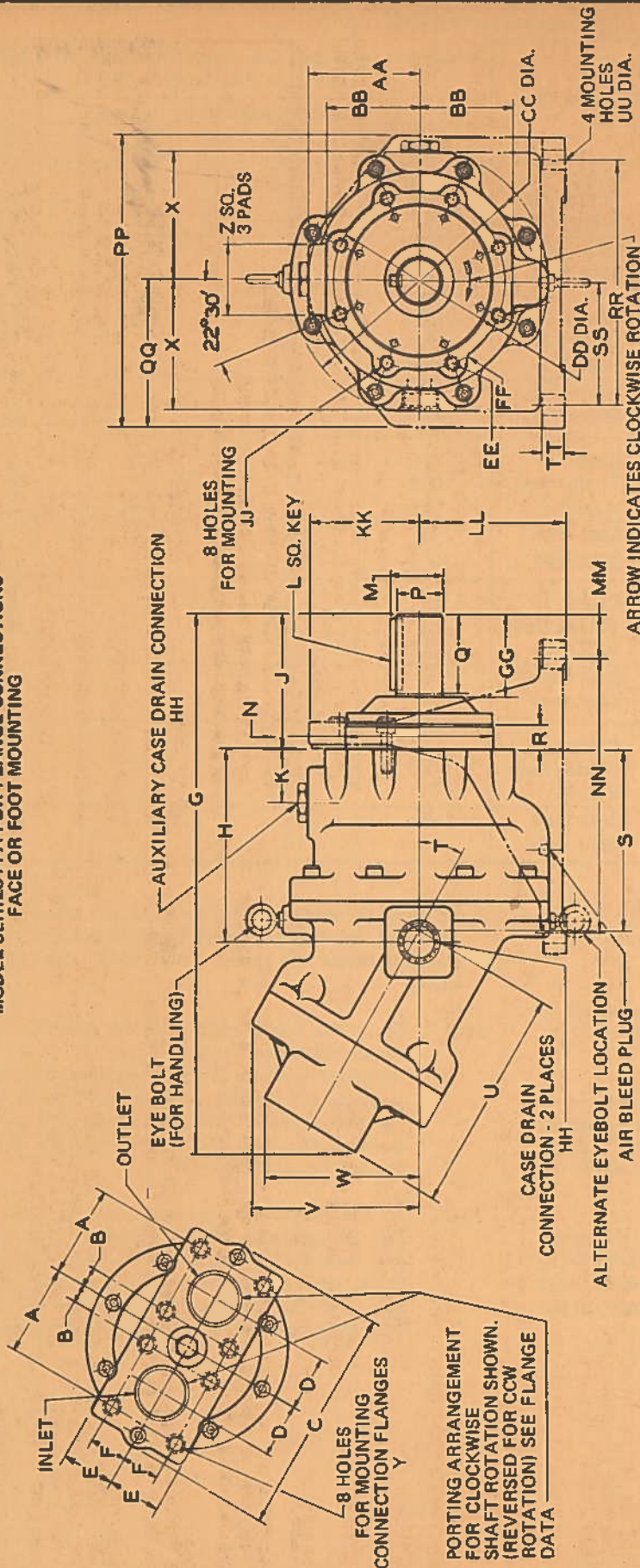
Step 1. Since the pump crosses center consider the two swash plate positions in Boxes "B" and "D" for left hand rotation. Since the external drive member is below the PVB45, position No. 3 in "B" applies for the outlet on the right facing the ports, and position No. 1 in "D" applies for the outlet on the left facing the ports.

Step 2. In the minimum diameter chart for No. 1 and No. 3, locations of the external drive member, and model PVB45-LDF-20-DAA-30, read for the chain drive that the minimum diameters to be NR and 10 and therefore cannot be used. A change to positions 2 and 4 should be considered.

DATA SHEET 507010-3



# **SPERRY VICKERS** **FIXED DISPLACEMENT ANGLE-TYPE PISTON PUMP** MODEL SERIES PFA FOR FLANGE CONNECTIONS FACE OR FOOT MOUNTING



REVISED 3-1-74

MODEL SERIES	A	B	C	D	E	F	G	H	J	K	L	M	N	P DIA.	Q	R	S	T	U	V	W	X	Y
PFA50-23	4.000	.750	9.50	2.375	2.38	1.625	22.72	8.00	5.69	2.12	.375	1.922	6.499	1.7495	2.69	1.125	7.31	23°30'	9.19	6.00	5.88	5.88	.625-11 UNC-2B THD. 1.25 DEEP
							1.912					6.495	1.7490	30°				6.62		6.66	8.53		7.00
							28.62					23°30'	8.53	7.00				11.75		9.14	8.38		6.62
PFA50-30							28.12	10.06	7.06	2.81	.625	2.779	7.999	2.4995	4.12	1.312	9.44	30°	11.75	9.14	8.38	6.62	.875-9 UNC-2B THD. 1.25 DEEP
PFA120-23											2.769	7.995	2.4990										
PFA120-30 & PFA150-30	4.750	1.000	12.12	2.875	2.81	1.875	28.12																
MODEL SERIES	Z	AA	BB	CC DIA.	DD DIA.	EE RAD.	FF RAD.	GG	HH	JJ	KK	LL	MM	NN	PP	QQ	RR	SS	TT	UU			
PFA50-23	3.25	5.00	4.20	11.75	7.750	.62	1.00	2.86	1.312-12 UN-2B THD. (FOR 1" O.D. TUBING)	.500-13 UNC-2B THD. 1.12 DEEP	4.75	7.750 ±.005	1.44	11.500	11.50	5.75	9.875	4.938	1.06	.78			
PFA50-30																							
PFA120-23																							
PFA120-30 & PFA150-30	3.75	6.00	5.12	13.88	9.375	.75	.75	4.25	1.875-12 UN-2B THD. (FOR 1-1/2" O.D. TUBING)	.750-10 UNC-2B THD. 1.50 DEEP	6.00 ±.005	8.000 ±.005	2.31	14.250	15.00	7.50	13.000	6.500	1.44	1.06	508100		

508100

**SPERRY VICKERS**  
 TROY, MICHIGAN 48064

**PISTON PUMP**  
 (ANGLE TYPE)

**PFA SERIES**  
 FIXED DISPLACEMENT

**NOMINAL 50,**  
 120 & 150  
 GPM

**RATED**  
 2500 &  
 3000 PSI

**FACE OR**  
 FOOT MOUNTING

**DWG. NO.**  
 508100



## GENERAL DATA

THESE POSITIVE DISPLACEMENT, AXIAL PISTON PUMPS ARE DESIGNED FOR HYDRAULIC SYSTEMS REQUIRING A NON-VARIABLE FLOW OF FLUID. THE COMPACT DESIGN FEATURES A HIGH DELIVERY RATIO PER UNIT SIZE, HIGH OVERALL EFFICIENCIES, AND LONG SERVICE LIFE.

## OPERATING SPECIFICATIONS

MODEL SERIES	THEORETICAL DISPLACEMENT (CU. IN./REV.)	GPM DELIVERY		DRIVE SPEED (RPM)	PRESSURE (PSI)	APPROXIMATE WEIGHT (LBS.)	
		RATED	MAX.	RATED	MAX.	FT. MTG.	FACE MTG.
PFA50-23	7.56	40	60	1200	3000	265	215
PFA50-30	9.48	50	75	1200	3000	265	215
PFA120-23	18.91	100	150	1200	3000	550	425
PFA120-30	23.71	120	180	1200	3000	550	425
PFA150-30	28.96	150	150	1200	2500	550	425

NOTE: VICKERS ENGINEERING APPROVAL IS REQUIRED FOR ALL APPLICATIONS WITH SPEEDS ABOVE 1200 RPM.

## INSTALLATION

POSITIONAL ATTITUDE OF THE PUMP IS NOT LIMITED. A FULL SIZE UNRESTRICTED DRAIN LINE MUST BE CONNECTED DIRECTLY FROM THE CASE DRAIN CONNECTION TO A LOCATION BELOW THE LOWEST FLUID LEVEL IN THE SYSTEM RESERVOIR.

PRESSURE SURGES AT THE DRAIN CONNECTION MAY NOT EXCEED 20 PSI.

IF RESERVOIR IS ABOVE PUMP AN ADEQUATE AIR VENT TO ATMOSPHERE ABOVE RESERVOIR FLUID LEVEL MUST BE PROVIDED TO INSURE COMPLETE FILLING OF PUMP CASE.

CIRCUIT MUST PROVIDE FOR CIRCULATION OF COOL OIL THROUGH PUMP HOUSING FROM BOTTOM TO TOP DRAIN CONNECTION.

## PFA50 SERIES:

1200 RPM - CIRCULATE 2 GPM  
1800 RPM - CIRCULATE 4 GPM

## PFA120 SERIES:

1200 RPM - CIRCULATE 3 GPM  
1800 RPM - CIRCULATE 5 GPM

## PFA150 SERIES:

CIRCULATE 3 GPM

CASE PRESSURE OF 10 PSI  $\pm$  5 MUST BE MAINTAINED WHEN OPERATING AT SPEEDS ABOVE 1200 RPM. IF NECESSARY, 5 OR 10 PSI CHECK VALVE MAY BE USED IN THE CASE-COOLING OIL CIRCUIT TO OBTAIN CASE PRESSURE.

## STARTING

BEFORE STARTING, FILL CASE WITH SYSTEM FLUID THRU UPPERMOST DRAIN PORT. HOUSING MUST BE KEPT FULL AT ALL TIMES TO PROVIDE INTERNAL LUBRICATION.

## DRIVE ROTATION

UNITS ARE AVAILABLE FOR EITHER RIGHT OR LEFT-HAND ROTATION. SPECIFY ROTATION WHEN ORDERING. PUMP IS ILLUSTRATED FOR CLOCKWISE ROTATION (RIGHT-HAND) AS SHOWN BY ARROW ON SHAFT-END VIEW. PORTS ARE REVERSED FOR COUNTERCLOCKWISE (LEFT-HAND) ROTATION.

## PUMP INLET CONDITIONS

FOR APPLICATIONS OVER 1200 RPM, FOR SYNTHETIC FIRE RESISTANT FLUIDS, (WITH ENGINEERING REVIEW AND COMMENTS), 100 PSI SUPERCHARGE PRESSURE IS PREFERRED. NOTE THAT INLET PRESSURE REDUCES SOUND.

MODEL	ABSOLUTE MINIMUM PRESSURE AT PUMP INLET		*SYNTHETIC FIRE RESISTANT FLUIDS - 1200 RPM ONLY
	1200 RPM	TO 1800 RPM	
PFA50	4" HG	50 PSI	100 PSI
PFA120	4" HG	NOT APPROVED	
PFA150	4" HG	NOT APPROVED	

\*COMMONLY USED INDUSTRIAL SYNTHETIC FIRE RESISTANT FLUIDS ONLY. NO WATER GLYCOL, WATER-IN-OIL EMULSION OR SOLUBLE OIL-IN-WATER SOLUTIONS.

MINIMUM OUTLET PRESSURE

A MINIMUM PRESSURE OF 150 PSI AT THE PUMP OUTLET IS RECOMMENDED.

NOTE: IF SYSTEM PRESSURE IS IMPOSED ON THE PUMP INLET AND OUTLET PORTS AT THE SAME TIME, EVEN FOR A SHORT DURATION, PUMP SHOULD PROBABLY HAVE A MOTOR VALVE PLATE. CONTACT VICKERS APPLICATION ENGINEER FOR ASSISTANCE.

FILTRATION RECOMMENDED

WITH ATMOSPHERIC INLET

INLET LINE. .... 74 MICRONS

IN ADDITION, 25 MICRON PARTIAL FLOW FILTRATION (20% MINIMUM) OF THE OIL RETURNING TO TANK SHOULD BE USED.

WITH SUPERCHARGE INLET

25 MICRON FILTER TO BE USED ON THE PISTON PUMP INLET.

CIRCULATING CASE-COOLING OIL. .... 25 MICRONS

## FLUID

CLEAN PETROLEUM ANTIWEAR INDUSTRIAL HYDRAULIC OIL OR AUTOMOTIVE CRANK-CASE OIL DESIGNATED SC SD OR SE. RUNNING VISCOSITY RANGE 70-250 SUS. OPERATING TEMPERATURE 120° F RECOMMENDED, 150° F USUAL MAXIMUM. REFER TO DATA SHEET 1-286-S (SECTION L) FOR HYDRAULIC OIL RECOMMENDATIONS.

THESE UNITS ARE DESIGNED TO MEET SPECIFICATIONS AS OUTLINED. TO INSURE MAXIMUM UNIT PERFORMANCE, IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION, CONSULT YOUR APPLICATION ENGINEER IF YOUR:

PRESSURE REQUIREMENTS ARE ABOVE RATED PRESSURES.

SPEED IS ABOVE RATED RPM.

SYSTEM REQUIRES FIRE-RESISTANT FLUID.

OPERATING TEMPERATURE IS NOT WITHIN 100° F. TO 150° F. WITH PROPER APPLICATION AND FLUID CONSIDERATION, A GREATER TEMPERATURE RANGE IS PERMISSIBLE.

OIL VISCOSITY AT OPERATING TEMPERATURE IS NOT WITHIN 100 TO 250 SSU.

OIL VISCOSITY AT START UP IS IN EXCESS OF 1000 SSU.

APPLICATION REQUIRES AN INDIRECT DRIVE.

NEEDS REQUIRE APPLICATION ASSISTANCE.

## MODEL CODE

## PUMP

PFA 120 - 30 - F R - 10

## FIXED DISPLACEMENT

## ANGLE-TYPE DESIGN

SERIES SIZE - 50, 120 OR 150

ANGLE OF DISPLACEMENT

23 - 25° 30'

30 - 30°

## DESIGN NUMBER

DESIGN NUMBERS SUBJECT TO CHANGE. INSTALLATION DIMENSIONS REMAIN AS SHOWN FOR DESIGN NUMBERS 10 THRU 19.

## ROTATION

R - RIGHT HAND (CW)

L - LEFT HAND (CCW)

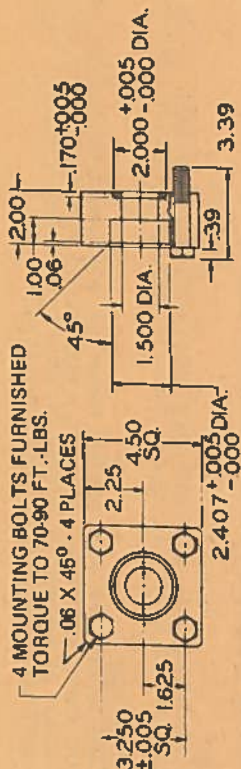
## FOOT MOUNTING

OMIT FOR FACE MOUNTING

508100-1



# 5000 PSI FLANGE FOR PFA50 PUMPS MODEL FL-4-50-16WS-10



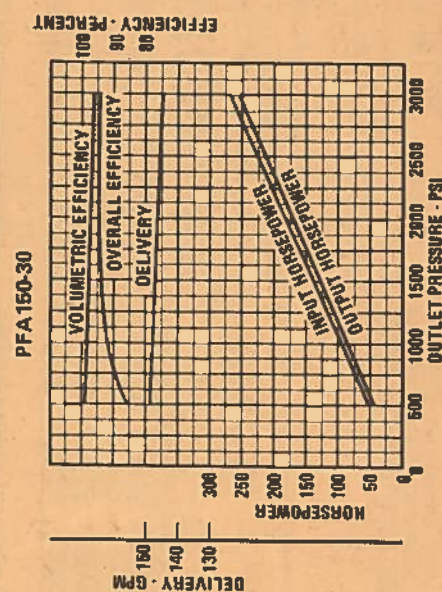
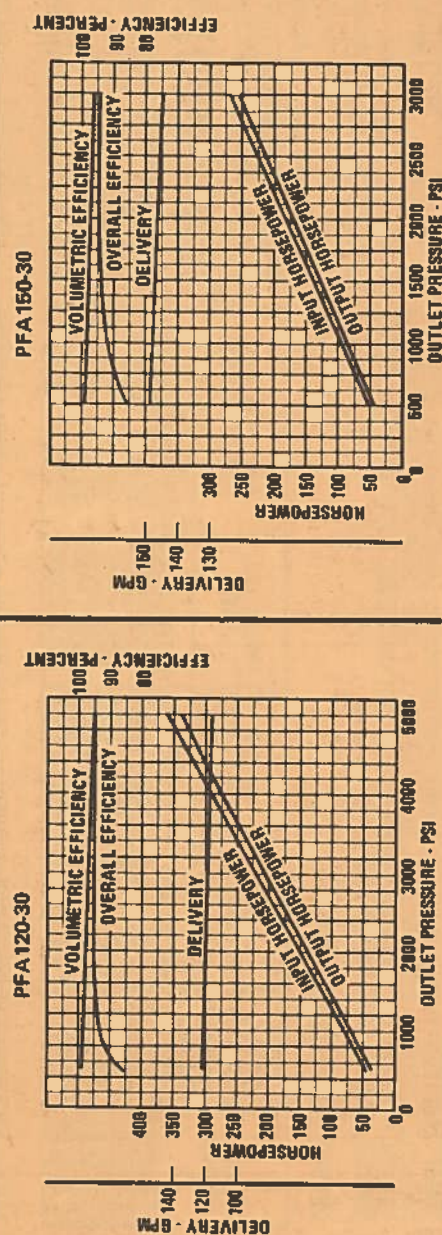
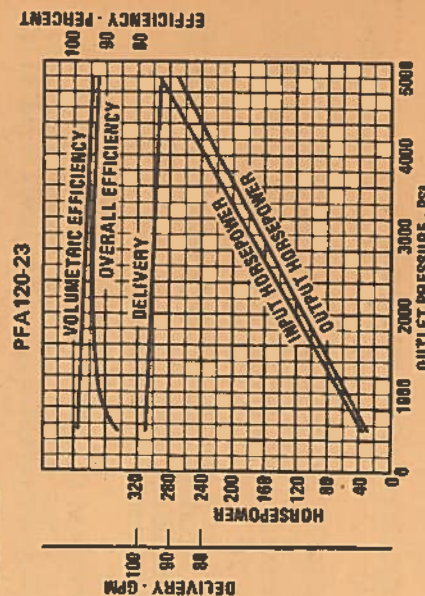
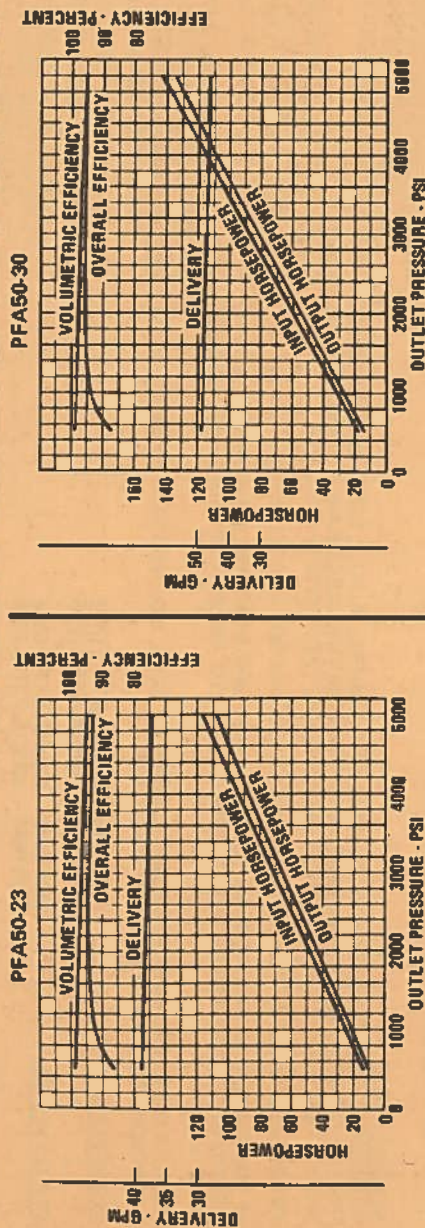
INLET AND OUTLET FLANGES FOR THREADED AND SOCKET WELD PIPE CONNECTIONS ARE TABULATED BELOW. SEE DRAWING 522900 FOR ADDITIONAL FLANGE INFORMATION FOR SERIES PFA120 AND PFA150.

MODEL SERIES	CONNECTION FLANGE		PIPING SIZE	FLANGE DESIGN
	MODEL NUMBER	WELDED		
PFA120 & PFA150	FL-20-WS-20	FL-20-PS-20	2 1/2"	STRAIGHT
	FL-20-WL-20	FL-20-PL-20	2 1/2"	ELL
	FL-24-WS-20	FL-24-PS-20	3"	STRAIGHT
	FL-24-WL-30	FL-24-PL-20	3"	ELL

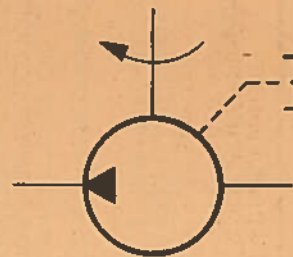
FLANGES TABULATED ABOVE ARE RATED FOR 3000 PSI. STRAIGHT FLANGES WITH SAE GRADE 8 SCREWS FOR USE TO 5000 PSI CAN BE SUPPLIED. SPECIFY BY ADDING "HP" TO MODEL NUMBER. EXAMPLE: FL-20-WS-HP-20. TORQUE "HP" FLANGE SCREWS TO 175-200 FT.-LBS.

## PERFORMANCE CHARACTERISTICS

FLUID VISCOSITY - 100 SSU FLUID TEMP. (INLET) - 120°F. INPUT SPEED - 1200 RPM



STANDARD GRAPHICAL SYMBOL FOR FLUID POWER DIAGRAMS





## SPECIFICATIONS

**SPERRY VICKERS**  
TROY, MICHIGAN 48064

## SPECIFICATIONS

### PISTON PUMP INLINE TYPE

## PFB5 FIXED DISPLACEMENT

**5 GPM - 3000  
PSI OUTLET**

### FOOT OR FLANGE MOUNTING

DWG. NO.  
507725

## SPECIFICATIONS

FLUID	MAXIMUM SPEED (RPM)	MAXIMUM PRESSURE (PSI)	* MINIMUM INLET PRESSURE (100 SUS FLUID) @ 1800 RPM	OPERATING TEMPERATURE (° F)
PETROLEUM	3600	3000	12 PSIA	150° F.
† SYNTHETIC PHOSPHATE ESTER	1800	2500	12 PSIA	130° F.
WATER-IN-OIL EMULSION	1800	2500	13 PSIA	130° F.
WATER GLYCOL	1800	2500	13 PSIA	130° F.

\* SEE INLET CURVE AND FLUID RECOMMENDATIONS DATA SHEET 1286-S AND FLUID LIFE CHART 507000.  
† F3 SEALS REQUIRED (SEE MODEL CODE).

## SPECIFICATIONS

**SPERRY VICKERS | PFB5 PISTON PUMP**

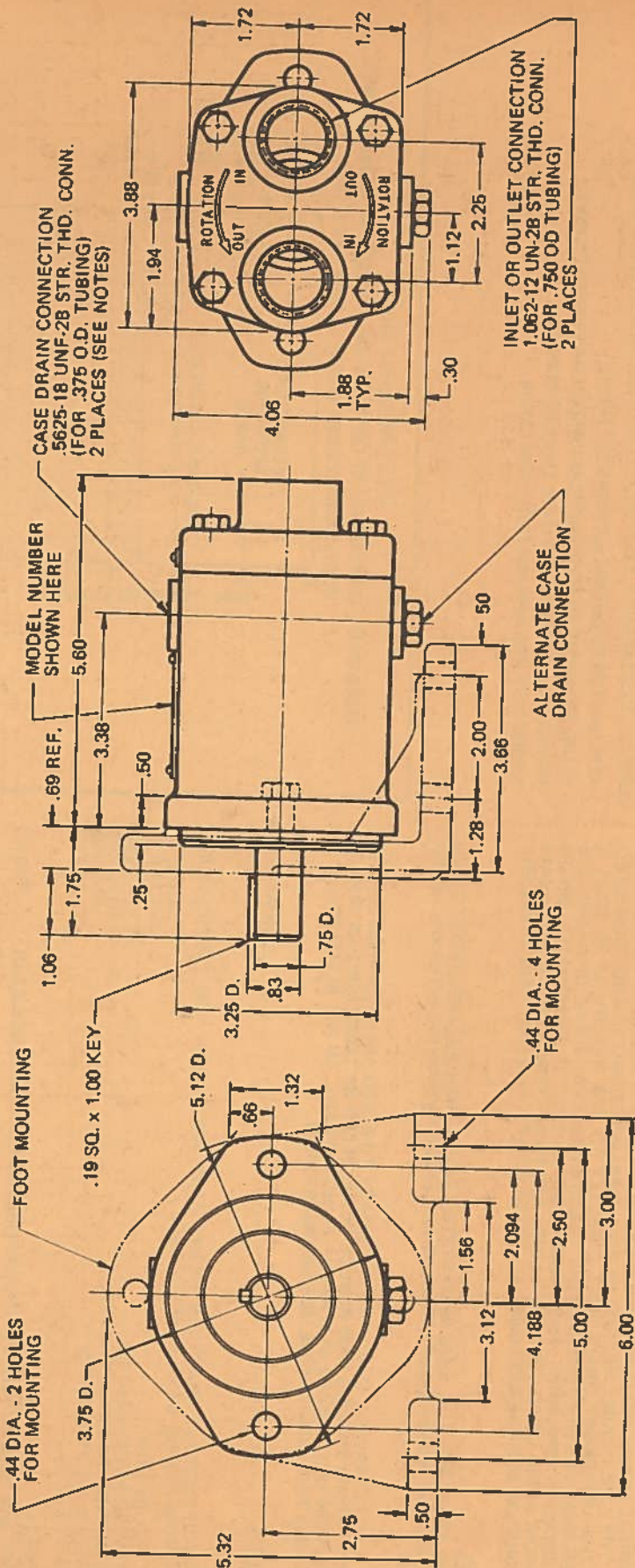
**INLINE TYPE - FIXED DISPLACEMENT  
5 GPM AT 1800 RPM - 3000 PSI OPERATING PRESSURE  
FOOT OR FLANGE MOUNTING - 20 DESIGN**

## GENERAL USAGE

FOR USE IN HYDRAULIC SYSTEMS REQUIRING A PUMP WITH A FIXED FLOW RATE WHERE PRESSURES DO NOT EXCEED 3000 PSI AND WHERE HIGH VOLUME METRIC EFFICIENCY IS DESIRABLE.



## STANDARD GRAPHICAL SYMBOL FOR FLUID POWER DIAGRAMS



REVISÉ 5-1-77

C - 9

SEC  
C

507726



# INSTALLATION

HORIZONTAL MOUNTING IS RECOMMENDED TO MAINTAIN NECESSARY CASE FLUID LEVEL. THE CASE DRAIN LINE MUST BE FULL SIZE UNRESTRICTED AND CONNECTED FROM THE UPPERMOST DRAIN PORT DIRECTLY TO THE RESERVOIR IN SUCH A MANNER THAT THE HOUSING REMAINS FILLED WITH FLUID. PIPING OF DRAIN LINE MUST PREVENT SIPHONING. PIPE DRAIN LINE SO THAT IT TERMINATES BELOW RESERVOIR FLUID LEVEL. NO OTHER LINES ARE TO BE CONNECTED TO THIS DRAIN LINE. CAUTION MUST BE EXERCISED TO NEVER EXCEED 5 PSI UNIT CASE PRESSURE.

# STARTING

BEFORE STARTING, FILL CASE WITH SYSTEM FLUID THROUGH UPPERMOST DRAIN PORT. HOUSING MUST BE KEPT FULL AT ALL TIMES TO PROVIDE INTERNAL LUBRICATION.

WHEN FIRST STARTING, IT MAY BE NECESSARY TO BLEED AIR FROM PUMP OUTLET LINE TO PERMIT PRIMING AND REDUCE NOISE. BLEED BY LOOSENING AN OUTLET CONNECTION UNTIL SOLID STREAM OF FLUID APPEARS. AN AIR BLEED VALVE IS AVAILABLE FOR THIS PURPOSE. SEE DRAWING 521801.

FILTRATION ..... 25 MICRON

# FLUIDS

SEE SPECIFICATIONS CHART ON FRONT PAGE AND FLUID AND TEMPERATURE RECOMMENDATIONS DATA SHEET 1-286-S.

## FLUID TYPE

ANTIWEAR HYDRAULIC OIL.....	LIFE FACTOR %
SYNTHETICS (PHOSPHATE ESTER).....	100
WATER-IN-OIL EMULSIONS.....	75 TO 100
WATER GLYCOL.....	40 TO 60

# SOUND DATA

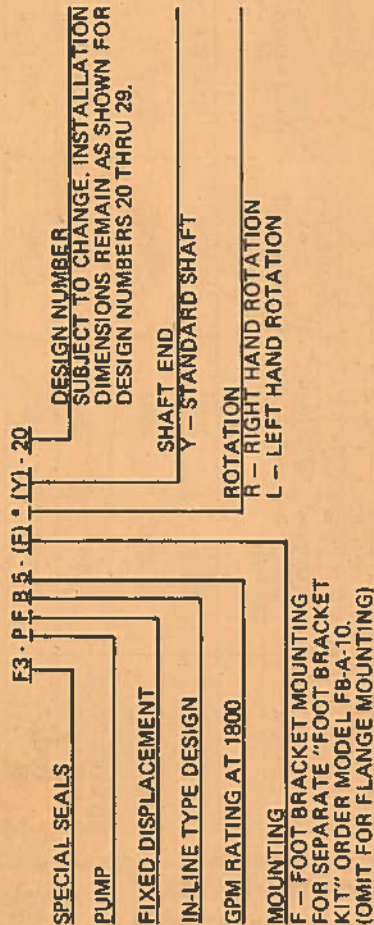
AT 1800 RPM, 3000 PSI AND OTHER PERFORMANCE CONDITIONS SHOWN..... 75dB(A)

WEIGHT LBS. (APPROX.)

FLANGE MOUNTING..... 11

FOOT MOUNTING..... 15

# MODEL CODE



THESE UNITS ARE DESIGNED TO MEET SPECIFICATIONS AS OUTLINED, TO INSURE MAXIMUM UNIT PERFORMANCE, IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION, CONSULT YOUR SPERRY VICKERS APPLICATION ENGINEER IF YOUR:

APPLICATION REQUIRES AN INDIRECT DRIVE.

FLUID DOES NOT MEET SPECIFICATIONS ON DATA SHEET 1-286-S.

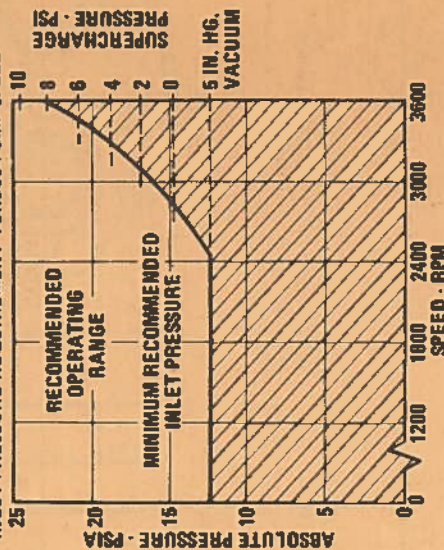
MOUNTING ATTITUDE IS OTHER THAN HORIZONTAL.

NEEDS REQUIRE APPLICATION ASSISTANCE.

## INLET PRESSURE CURVE

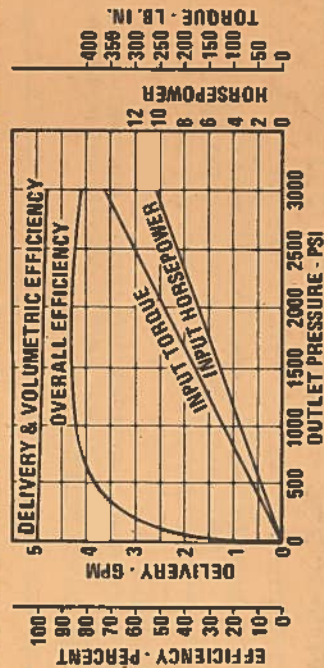
BASED ON OIL TEMPERATURE OF 120° F. (100 SSU) VISCOSITY OF 150 SSU AT 100° F.

INLET PRESSURE REQUIREMENT VERSUS PUMP SPEED



## TYPICAL PERFORMANCE CHARACTERISTICS

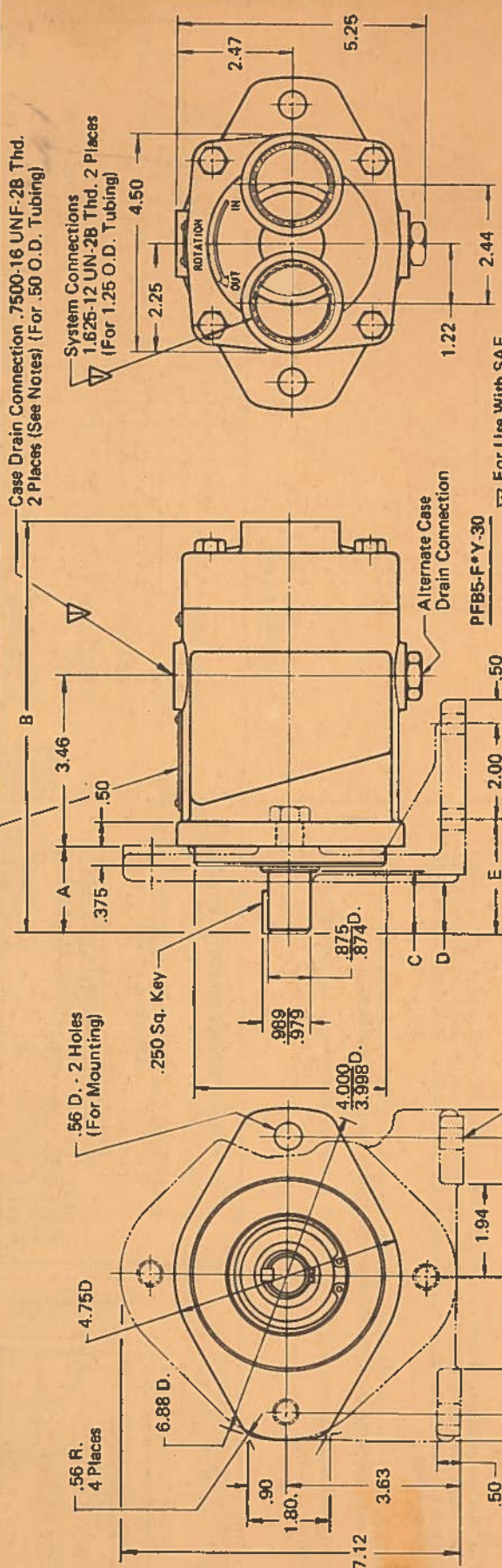
BASED ON OIL TEMPERATURE OF 120° F. (100 SSU) 1800 RPM INPUT - 5 IN. HG. VACUUM INLET





**SPERRY VICKERS**  
 TROY, MICHIGAN 48064

Model	A	B	C	D	E
PFB10-30	1.75	8.42	1.312	—	—
PFB10-Y-30	2.31	8.98	1.874	—	—
PFB10-F-30	1.75	8.42	1.312	1.06	2.34
PFB10-F-Y-30	2.31	8.98	1.874	1.62	2.90

Model Number  
Shown Here

PFBS-F-Y-30

 For Use With SAE  
 Standard Hydraulic  
 Fittings And "O" Ring Seals

## OPERATING SPECIFICATIONS

Fluid	Delivery GPM		Speed-RPM See Curves	Pressure PSI	Input Horsepower		Minimum Inlet Pressure	Operating Temp. °F.
	1800 RPM	Max. RPM			1800 RPM	1500 PSI		
Petroleum Oil	18	12.2	3200	3000	35	See Inlet Curve	See Inlet Curve	100-150
Soluble Oil	10	10	2200	2000	15	3 in. Hg Vac	3 in. Hg Vac	120
Synthetics Phosphate Ester	10	10	1800	2500	17	5 in. Hg Vac	5 in. Hg Vac	100-130
Common Water Oil Emulsions	10	10	1800	2500	17	3 in. Hg Vac	3 in. Hg Vac	100-130
Water Glycol	10	10	1800	2500	17	3 in. Hg Vac	3 in. Hg Vac	100-130

● Add Prefix "F3" To Model Number.

## FLUID TYPE

## APPROXIMATE REDUCTION OF LIFE

 Synthetics (Phosphate Ester)  
 Common Water-Oil Emulsions  
 Water-Glycol Fluids  
 Soluble Oil

 0 - 25%  
 20 - 30%  
 40 - 60%  
 50%

## INSTALLATION

Horizontal mounting is recommended to maintain necessary case fluid level. The case drain line must be full size unrestricted and connected from the uppermost drain port directly to the reservoir in such a manner that the housing remains filled with fluid. Piping of drain line must prevent siphoning. Pipe drain line so that it terminates below reservoir fluid level. No other lines are to be connected to this drain line. Caution must be exercised to never exceed 10 PSI unit case pressure.

## STARTING

Before starting, fill case with system fluid thru uppermost drain port. Housing must be kept full at all times to provide internal lubrication. When first starting it may be necessary to bleed air from pump outlet to permit priming and reduce noise. Bled by loosening an outlet connection until a solid stream of fluid appears. An air bleed valve is available for this purpose. See drawing 521801.

REVISED 12-1-78

507727

SEC.



### General Data

This unit is of the axial piston, fixed displacement, in-line design. Theoretical displacement is 1.29 cu. in./rev.

### Shaft Rotation

Right hand only.

### Filtration

Pressure or Return Line Recommended. . . . . 35 Micron Absolute or Less  
For soluble oil select filter with an element compatible with the specific emulsion and which will permit the oil and water to remain emulsified. Consult fluid and filter manufacturer.

### Fluids

#### Petroleum Oil

Clean petroleum antiwear industrial hydraulic oil or automotive crankcase oil designated SC, SD or SE. Running viscosity range 70-250 SUS. Operating temperature 120° F. recommended, 150° usual maximum. Refer to data sheet I-286-S for hydraulic fluid and temperature recommendations.

#### Soluble Oil

An oil in water emulsion containing a 5% concentration of soluble oil is recommended. The soluble oil should be a high stability, high quality soluble oil.

To insure an effective emulsion the water should not have excessive hardness or have an acid nature. Preferably the water should be distilled or deionized. When mixing the solution the soluble oil should always be added to the water maintaining good fluid agitation. The water should never be added to the soluble oil.

Proper maintenance of oil content in the emulsion requires periodic testing of samples from the system for alkaline PH (a slightly 8 - 9% PH is recommended) and oil concentration.

Aluminum rolling oil containing 10% butyl stearate lubricity additive may also be used as the fluid medium.

### Fire-Resistant Fluid

Most fire resistant fluids are approved for use with this pump, provided that recommended operating temperature, inlet condition, proper viscosity and maintenance of fluid are observed. See tabulation.

This unit is designed to meet specifications as outlined. To insure maximum unit performance, in conjunction with your specific application, consult your local Sperry Vickers representative if your:

Oil viscosity at operating temperature is not within 70-250 SSU.

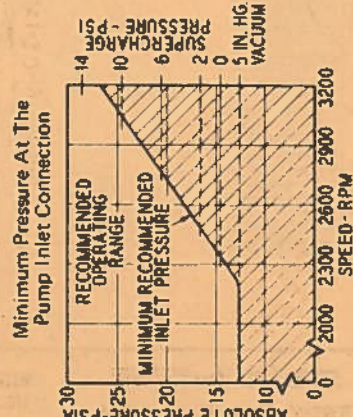
Oil viscosity at start-up is in excess of 1000 SSU.

Mounting attitude is other than horizontal.

Needs require application engineer.

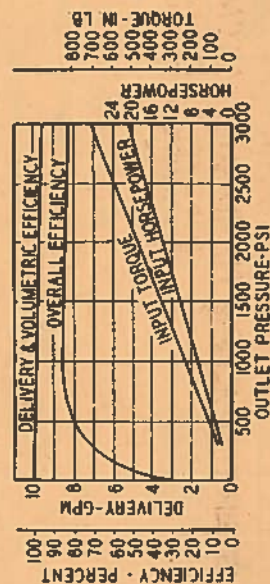
Weight Lbs. (Approx.) . . . . . 21

### INLET PRESSURE CURVE (WITH PETROLEUM OIL)

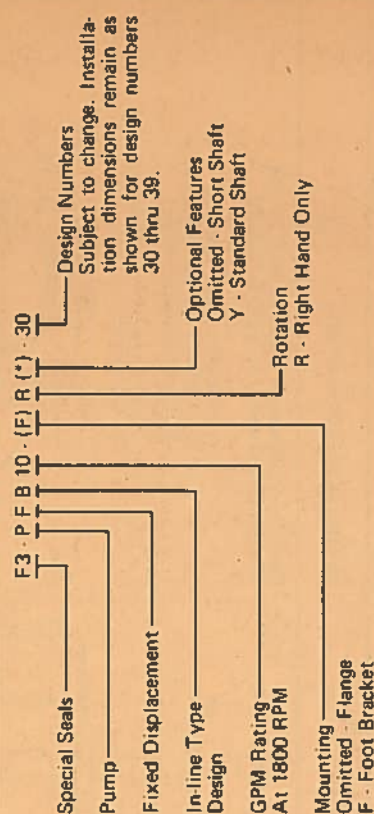


### PERFORMANCE CHARACTERISTICS (ALL FLUIDS—SOLUBLE OIL 2 TO 3% LOWER)

Based On Oil Temp. Of 120° F. (100 SSU) - 1800 RPM  
Atmospheric Inlet



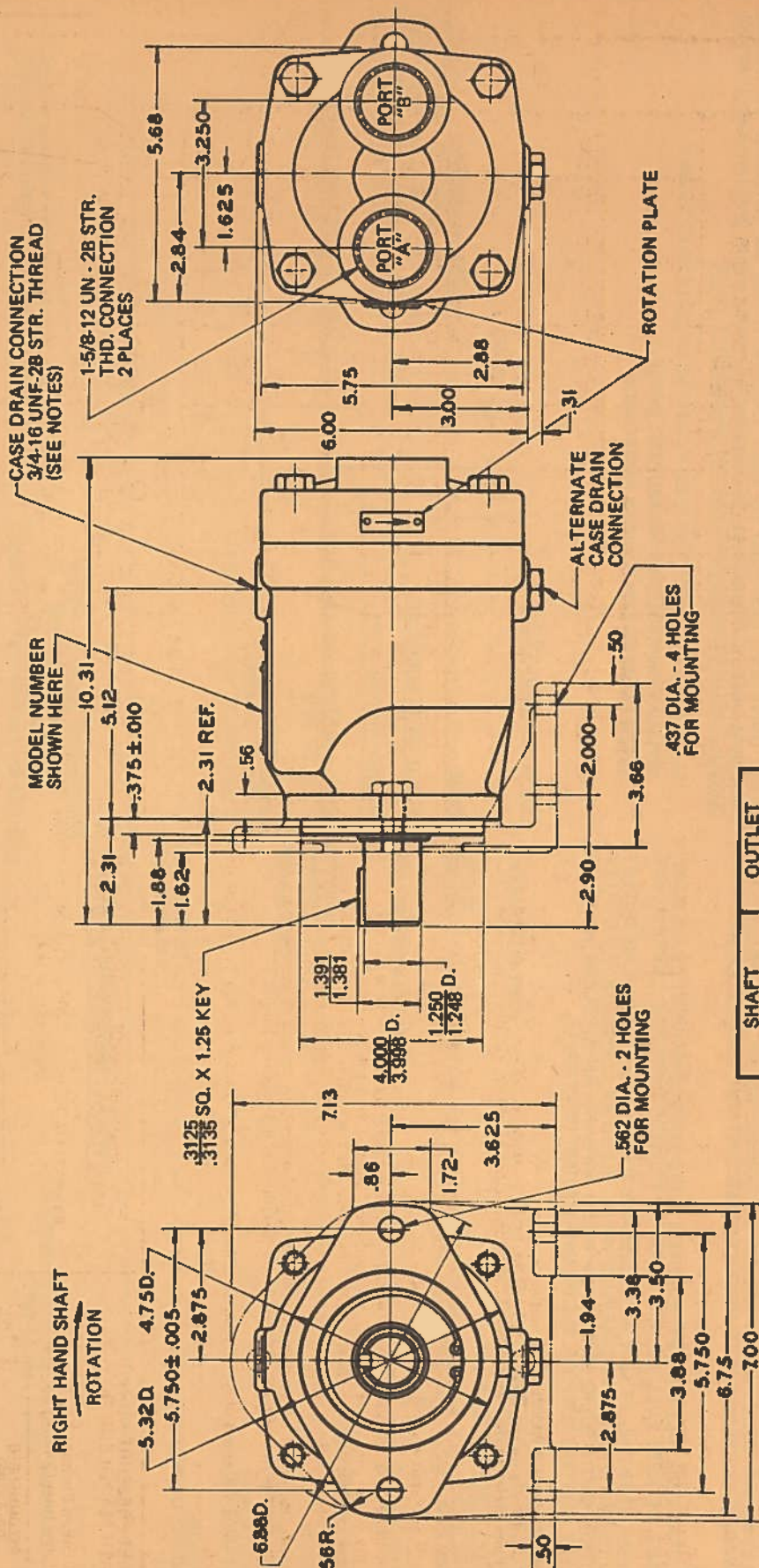
### Typical Model Code





**SPERRY-VICKERS**  
TROY, MICHIGAN 48064

# **SPERRY-VICKERS** T.M. **FIXED DISPLACEMENT, PISTON PUMPS** MODEL SERIES PFB20 (INLINE TYPE) FLANGE OR FOOT MOUNTING



SHAFT ROTATION	OUTLET PORT
R.H.	"A"

REVISED 3-1-74

507720



## GENERAL DATA

THESE UNITS ARE OF THE AXIAL PISTON, FIXED DISPLACEMENT, INLINE DESIGN RATED AT 20 GPM AT 1800 RPM AND 1500 PSI.

## INSTALLATION

HORIZONTAL MOUNTING IS RECOMMENDED TO MAINTAIN NECESSARY CASE FLUID LEVEL. THE CASE DRAIN LINE MUST BE FULL SIZE UNRESTRICTED AND CONNECTED FROM THE UPPERMOST DRAIN PORT DIRECTLY TO THE RESERVOIR IN SUCH A MANNER THAT THE CASE REMAINS FILLED WITH FLUID. PIPING OF DRAIN LINE MUST PREVENT SIPHONING. PIPE DRAIN LINE SO THAT IT TERMINATES BELOW RESERVOIR FLUID LEVEL. NO OTHER LINES ARE TO BE CONNECTED TO THIS DRAIN LINE. CAUTION MUST BE EXERCISED TO NEVER EXCEED 5 PSI UNIT CASE PRESSURE.

## STARTING

BEFORE STARTING, FILL CASE WITH SYSTEM FLUID THRU UPPERMOST DRAIN PORT. CASE MUST BE KEPT FULL AT ALL TIMES TO PROVIDE INTERNAL LUBRICATION. WHEN FIRST STARTING, IT MAY BE NECESSARY TO BLEED AIR FROM PUMP OUTLET LINE TO PERMIT PRIMING AND REDUCE NOISE. BLEED BY LOOSENING AN OUTLET CONNECTION UNTIL SOLID STREAM OF FLUID APPEARS. AN AIRBLEED VALVE IS AVAILABLE FOR THIS PURPOSE. SEE DRAWING 521601 (SECTION L).

## OPERATING SPECIFICATIONS

THEORETICAL DISPLACEMENT..... 2.61 CU. IN./REV.

DELIVERY (THEORETICAL)

AT 1800 RPM..... 20 GPM

AT 2400 RPM..... 26 GPM

OPERATING SPEED..... SEE CURVES BELOW

OPERATING PRESSURE

RATED..... 1500 PSI

MAXIMUM..... 2500 PSI

INLET PRESSURE..... SEE CURVE

DRIVE ROTATION

RIGHT HAND ONLY.

FILTRATION

PRESSURE OR RETURN LINE..... 25 MICRONS

INLET..... 149 MICRONS

## FLUID

CLEAN PETROLEUM ANTIWEAR INDUSTRIAL HYDRAULIC OIL OR AUTOMOTIVE CRANKCASE OIL DESIGNATED SC, SD OR SE. RUNNING VISCOSITY RANGE 70-260 SUS. OPERATING TEMPERATURE 120° F RECOMMENDED, 150° F USUAL MAXIMUM. REFER TO DATA SHEET 1-286-S (SECTION L) FOR HYDRAULIC OIL RECOMMENDATIONS.

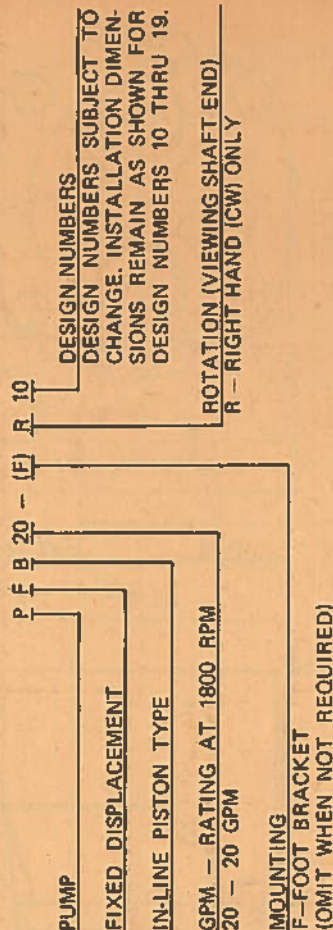
WEIGHT LBS. (APPROX.)..... 41

WITH FOOT MOUNTING..... 46

THESE UNITS ARE DESIGNED TO MEET SPECIFICATIONS AS OUTLINED. TO INSURE MAXIMUM UNIT PERFORMANCE, IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION, CONSULT YOUR VICKERS APPLICATION ENGINEER IF YOUR:

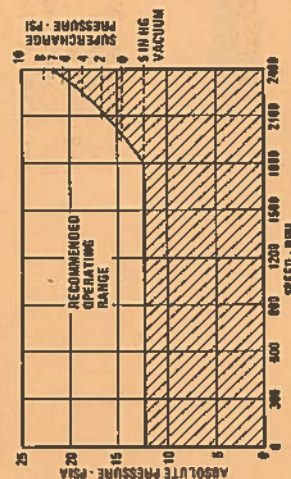
FLUID DOES NOT MEET THE SPECIFICATIONS OF DATA SHEET 1-286-S  
APPLICATION REQUIRES AN INDIRECT DRIVE  
NEEDS REQUIRE APPLICATION ASSISTANCE

## TYPICAL MODEL CODE



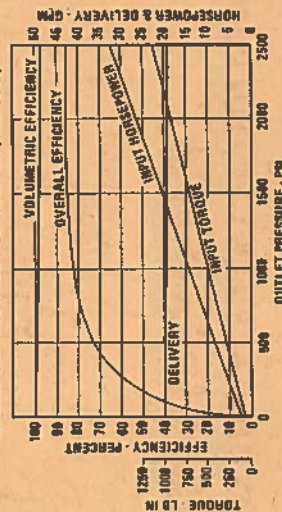
## TYPICAL PERFORMANCE CURVES

MINIMUM INLET PRESSURE REQUIREMENTS  
160 SSU FLUID @ 100° F.



## PERFORMANCE CHARACTERISTICS

INPUT SPEED - 1800 RPM  
ATMOSPHERIC INLET  
BASED ON OIL TEMP. OF 120° F. (100 SSU)



## STANDARD GRAPHICAL SYMBOLS FOR FLUID POWER DIAGRAMS

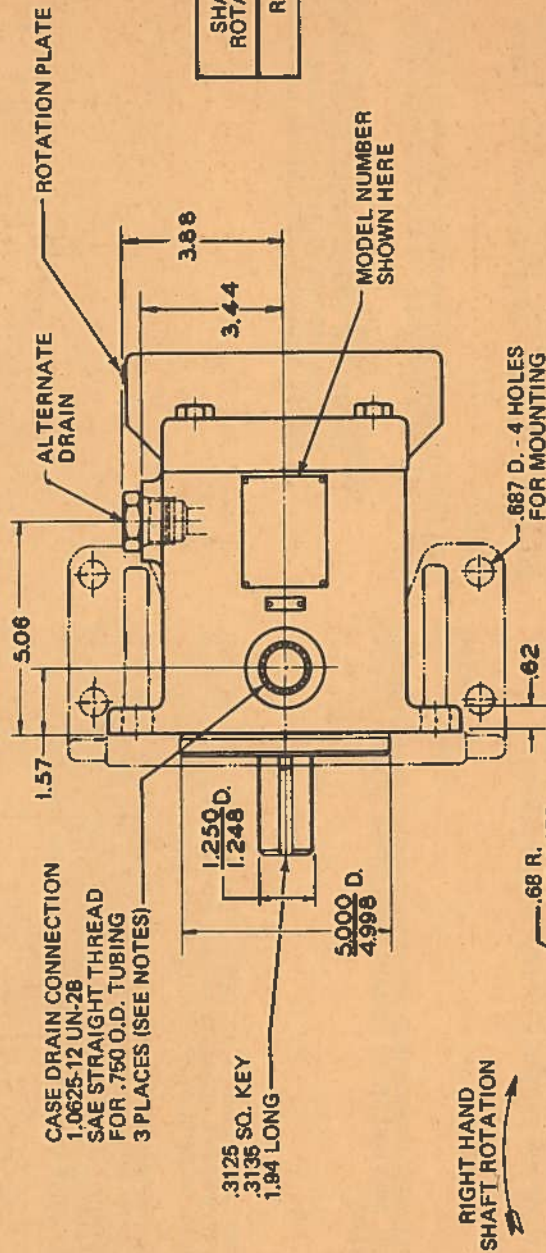




**SPERRY VICKERS**  
T.M.  
TROY, MICHIGAN 48064

# **SPERRY VICKERS FIXED DISPLACEMENT PISTON PUMPS**

MODEL SERIES F6-PFB20 AND F6-PFB29  
FOR USE WITH OIL IN WATER EMULSIONS

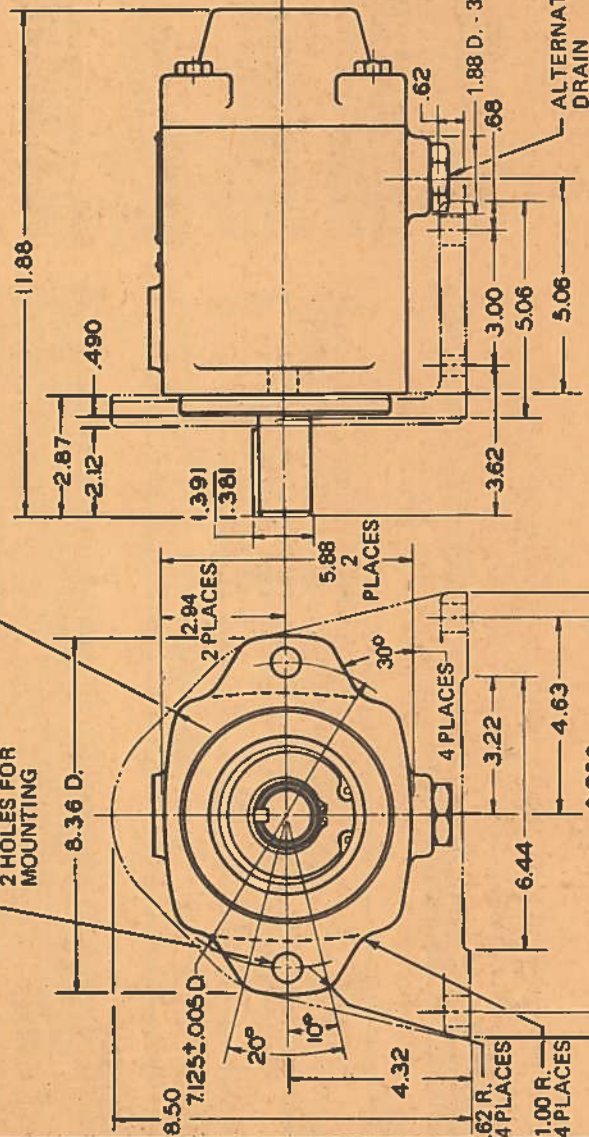


SHAFT ROTATION	OUTLET PORT
R.H.	"B"

RIGHT HAND  
SHAFT ROTATION

.68 R.  
4 PLACES

.688 D.  
2 HOLES FOR MOUNTING



**FIXED DISPLACEMENT  
PISTON PUMP  
IN-LINE TYPE**

**TO BE USED WITH  
OIL-IN-WATER  
EMULSIONS**

**MODELS RATED AT 20 &  
29 GPM, 1800 RPM,  
& 2000 PSI MAX.**

**FLANGE OR FOOT  
BRACKET MOUNTED**

**DWG. NO.  
507730**

REVISED 3-1-74

507730

SEC  
C



**GENERAL DATA**

THIS UNIT IS OF THE AXIAL PISTON, FIXED DISPLACEMENT INLINE DESIGN, WITH MAXIMUM DUTY OF 1800 RPM AND 2000 PSI.

**RATINGS**

MODEL SERIES	THEO. DIS-PLACEMENT CU IN/REV	MAX. DELIV. GPM	MAX. SPEED RPM	MAX. PRES-SURE PSI	INPUT HP 2000 PSI @ 1800 RPM	MIN. INLET PRESS. INCH Hg VAC.	MAX. CASE PRESS. PSI
F8PF820	2.61	20	1800	2000	27	5	5
F8PF829	3.76	29	1800	2000	38	5	5

**INSTALLATION**

HORIZONTAL MOUNTING IS RECOMMENDED TO MAINTAIN NECESSARY CASE FLUID LEVEL. THE CASE DRAIN LINE MUST BE FULL SIZE UNRESTRICTED AND CONNECTED FROM THE UPPERMOST DRAIN PORT DIRECTLY TO THE RESERVOIR IN SUCH MANNER THAT THE HOUSING REMAINS FILLED WITH FLUID. PIPING OF DRAIN LINE MUST PREVENT SIPHONING. PIPE DRAIN LINE SO THAT IT TERMINATES BELOW RESERVOIR FLUID LEVEL. NO OTHER LINES ARE TO BE CONNECTED TO THIS DRAIN LINE. CAUTION MUST BE EXERCISED TO NEVER EXCEED 5 PSI UNIT CASE PRESSURE.

**FILTRATION**

RETURN LINE..... 25 MICRONS  
INLET..... 149 MICRONS

SELECT FILTER WITH AN ELEMENT COMPATIBLE WITH THE SPECIFIC EMULSION AND WHICH WILL PERMIT THE OIL AND WATER TO REMAIN EMULSIFIED. CONSULT FLUID AND FILTER MANUFACTURER.

**DRIVE ROTATION**

RIGHT HAND ONLY.

**FLUIDS**

AN OIL-IN-WATER EMULSION CONTAINING A 5% CONCENTRATION OF SOLUBLE OIL IS RECOMMENDED (A 6 TO 8 PERCENT CONCENTRATION IS PREFERRED). THE SOLUBLE OIL SHOULD BE A STABLE, HIGH QUALITY SOLUBLE OIL. CHECK FREQUENTLY.

TO ASSURE AN EFFECTIVE EMULSION, THE WATER SHOULD NOT HAVE EXCESSIVE HARDNESS OR HAVE AN ACID NATURE, AND IT SHOULD BE DISTILLED OR DEIONIZED. WHEN PREPARING THE MIXTURE, THE SOLUBLE OIL SHOULD ALWAYS BE ADDED TO THE WATER WHILE MAINTAINING GOOD FLUID AGITATION. THE WATER SHOULD NEVER BE ADDED TO THE SOLUBLE OIL. DO NOT MIX SOLUBLE OIL BRANDS.

PROPER MAINTENANCE OF OIL CONTENT IN THE EMULSION REQUIRES PERIODIC TESTING FOR ALKALINE Ph AND OIL CONCENTRATION. THE ALKALINE Ph SHOULD BE MAINTAINED AT 8.0 - 9.5 Ph.

A REDUCTION OF PREDICTED LIFE FROM THAT OF PETROLEUM OIL SHOULD BE EXPECTED WHEN USING OIL-IN-WATER EMULSIONS. AS A RULE OF THUMB, 50% LIFE REDUCTION CAN BE USED FOR OIL-IN-WATER EMULSIONS COMPARED WITH PETROLEUM OILS.

ALUMINUM ROLLING OIL, CONTAINING 10% BUTYL STEARATE LUBRICITY ADDITIVE MAY ALSO BE USED AS THE FLUID MEDIUM. COMPARING ALUMINUM ROLLING OIL AND OIL-IN-WATER EMULSIONS, BOTH FLUIDS BEAR THE SAME RATINGS AND LIFE EXPECTANCY.

**STARTING**  
BEFORE STARTING, FILL CASE WITH SYSTEM FLUID THROUGH UPPERMOST DRAIN PORT. HOUSING MUST BE KEPT FULL AT ALL TIMES TO PROVIDE INTERNAL LUBRICATION.

WHEN FIRST STARTING, IT MAY BE NECESSARY TO BLEED AIR FROM PUMP OUTLET LINE TO PERMIT PRIMING AND REDUCE NOISE. BLEED BY LOOSENING AN OUTLET CONNECTION UNTIL SOLID STREAM OF FLUID APPEARS.

**FLANGES**

BOTH INLET AND OUTLET PORTS ACCEPT VICKERS' FLI-12-12P-10 OR FLI-12-12W-10 SAE 4-BOLT FLANGES; DATA ON DRAWING 1-250700

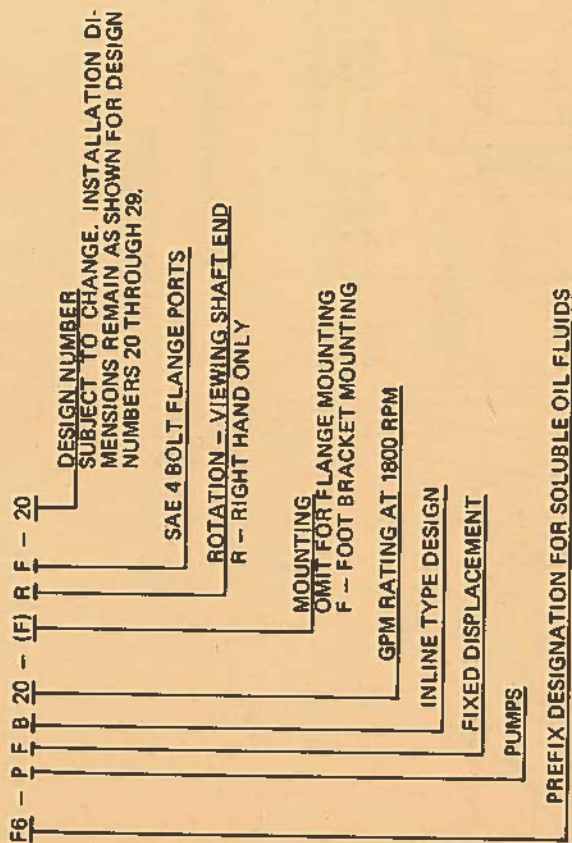
**WEIGHT**..... 63 LBS. (DRY)

THIS UNIT IS DESIGNED TO MEET SPECIFICATIONS AS OUTLINED. TO INSURE MAXIMUM UNIT PERFORMANCE IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION:

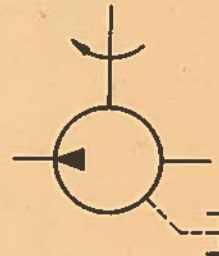
CONSULT YOUR VICKERS APPLICATION ENGINEER IF YOUR:  
OPERATING TEMPERATURE IS NOT WITHIN 100° F TO 120° F  
APPLICATION REQUIRES AN INDIRECT DRIVE  
NEEDS REQUIRE APPLICATION ASSISTANCE



# **MODEL CODE**

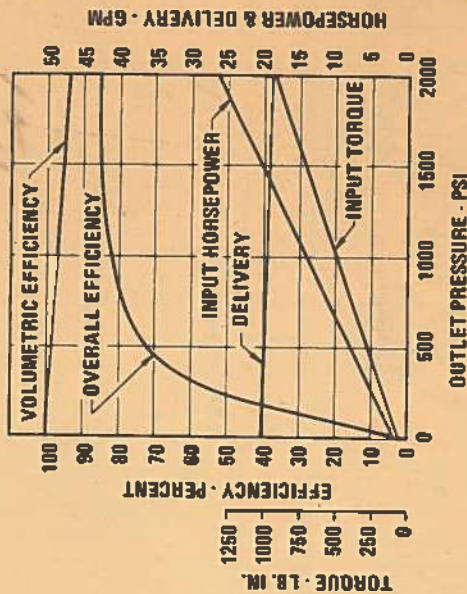


STANDARD GRAPHICAL SYMBOL FOR FLUID POWER DIAGRAMS



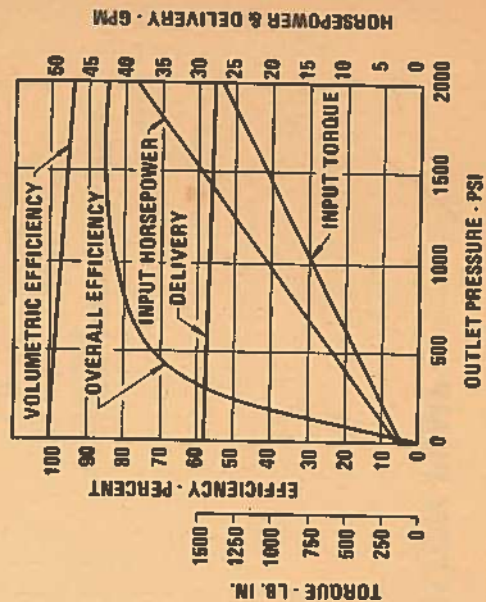
## **F6-PFB20-20**

PERFORMANCE CHARACTERISTICS:  
INPUT SPEED - 1800 RPM  
ATMOSPHERIC INLET  
FLUID TEMPERATURE - 120° F.



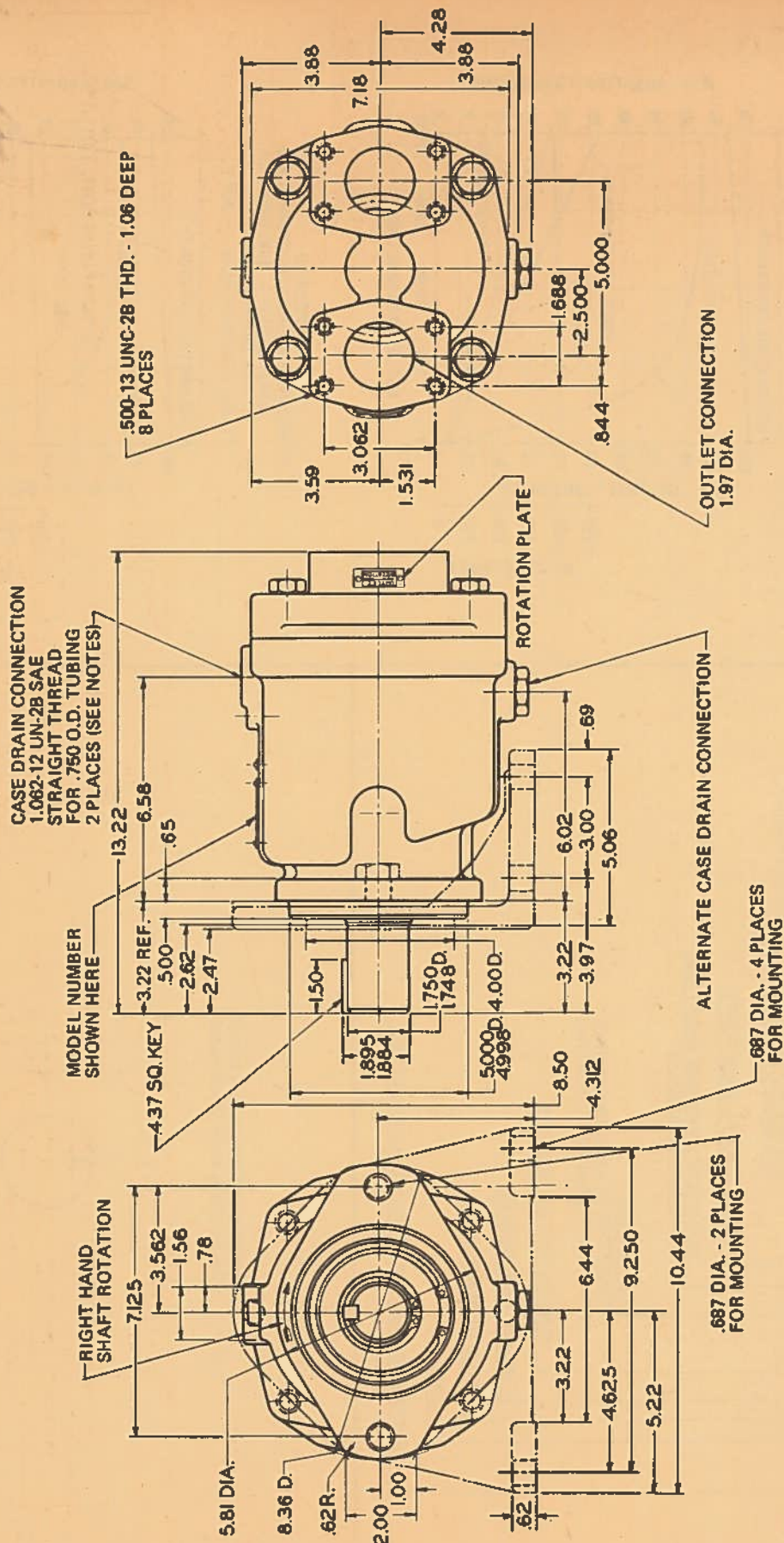
## **F6-PFB28-20**

PERFORMANCE CHARACTERISTICS:  
INPUT SPEED - 1800 RPM  
ATMOSPHERIC INLET  
FLUID TEMPERATURE - 120° F.





# **SPERRY-VICKERS** T.M. **FIXED DISPLACEMENT PISTON PUMP** MODEL SERIES PFB45 (INLINE TYPE) FLANGE OR FOOT MOUNTING



REVISED 3-1-74

507800

**SPERRY-VICKERS**  
 TROY, MICHIGAN 48084

**PISTON PUMP  
 INLINE TYPE**

**FIXED  
 DISPLACEMENT**

**45 GPM  
 3000 PSI OUTLET**

**FLANGE OR FOOT  
 MOUNTING**

**DWG. NO.  
 507800**



## GENERAL DATA

THESE UNITS ARE OF THE AXIAL PISTON, FIXED DISPLACEMENT, INLINE DESIGN  
RATED AT 45 GPM AT 1800 RPM AND 1500 PSI.

## INSTALLATION INFORMATION

HORIZONTAL MOUNTING IS RECOMMENDED TO MAINTAIN NECESSARY CASE FLUID  
LEVEL. THE CASE DRAIN LINE MUST BE FULL SIZE UNRESTRICTED AND CONNECTED  
FROM THE UPPERMOST DRAIN PORT DIRECTLY TO THE RESERVOIR IN SUCH A  
MANNER THAT THE HOUSING REMAINS FILLED WITH FLUID. PIPING OF DRAIN LINE  
MUST PREVENT SIPHONING. PIPE DRAIN LINE SO THAT IT TERMINATES BELOW  
RESERVOIR FLUID LEVEL. NO OTHER LINES ARE TO BE CONNECTED TO THIS DRAIN  
LINE. CAUTION MUST BE EXERCISED TO NEVER EXCEED 5 PSI UNIT CASE PRESSURE.

## STARTING

BEFORE STARTING, FILL CASE WITH SYSTEM FLUID THRU UPPERMOST DRAIN PORT.  
HOUSING MUST BE KEPT FULL AT ALL TIMES TO PROVIDE INTERNAL LUBRICATION.  
WHEN FIRST STARTING, IT MAY BE NECESSARY TO BLEED AIR FROM PUMP OUTLET  
TO PERMIT PRIMING AND REDUCE NOISE. BLEED BY LOOSENING AN OUTLET  
CONNECTION UNTIL SOLID STREAM OF FLUID APPEARS. AN AIRBLEED VALVE IS  
AVAILABLE FOR THIS PURPOSE. SEE DRAWING 521801.

## OPERATING SPECIFICATIONS

THEORETICAL DISPLACEMENT..... 5.76 CU. IN./REV.

DELIVERY..... 45 GPM  
AT 1800 RPM.  
AT 2200 RPM..... 55 GPM

OPERATING SPEED..... SEE CURVES BELOW

OPERATING PRESSURE..... 3000 PSI  
MAXIMUM.

INLET PRESSURE (MINIMUM)..... SEE CURVE

DRIVE ROTATION  
RIGHT HAND ONLY.

FILTRATION..... 25 MICRONS  
PRESSURE OR RETURN LINE.  
INLET..... 149 MICRONS

FLUID  
CLEAN PETROLEUM ANTIWEAR INDUSTRIAL HYDRAULIC OIL OR AUTOMOTIVE  
CRANKCASE OIL DESIGNATED SC, SD OR SE. RUNNING VISCOSITY RANGE 70-250  
SUS. OPERATING TEMPERATURE 120° F. RECOMMENDED. 150° F. USUAL MAXIMUM.  
REFER TO DATA SHEET I-286-S (SECTION L) FOR HYDRAULIC OIL RECOMMEN-  
TIONS.

FLANGES  
BOTH INLET AND OUTLET PORTS ACCEPT VICKERS' FL-1-16-16P.10 OR FL-1-16-16W.10  
SAE 4-BOLT FLANGES; DATA ON DRAWING I-250700.

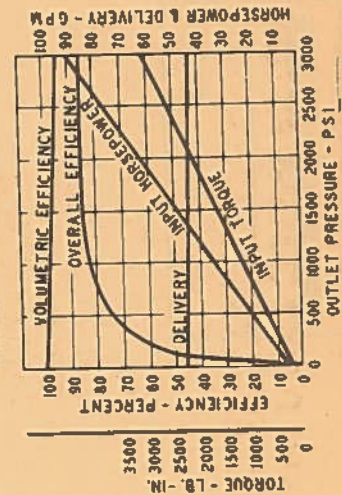
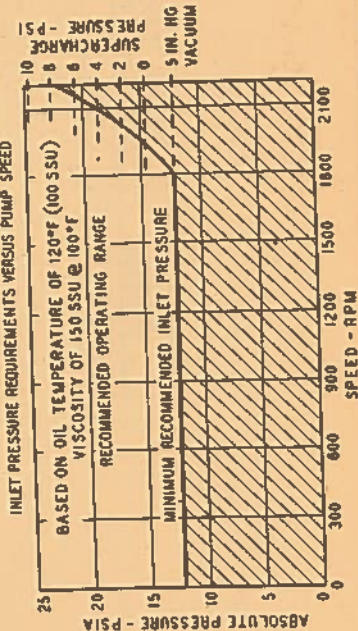
WEIGHT LBS. (APPROXIMATE)..... 73  
WITH FOOT MOUNTING..... 87

THESE UNITS ARE DESIGNED TO MEET SPECIFICATIONS AS OUTLINED. TO INSURE  
MAXIMUM UNIT PERFORMANCE IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION,  
CONSULT YOUR VICKERS APPLICATION ENGINEER IF YOUR:

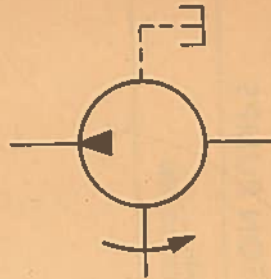
SPEED IS ABOVE 1800 RPM  
APPLICATION REQUIRES AN INDIRECT DRIVE  
MOUNTING ATTITUDE IS OTHER THAN HORIZONTAL  
NEEDS REQUIRE APPLICATION ASSISTANCE

MODEL CODE	P	F	B	45	—	(F)	R	F	—	10
PUMP										
FIXED DISPLACEMENT										
INLINE TYPE DESIGN										
RATING										
45 — 45 GPM @ 1800 RPM										
MOUNTING TYPE										
F — FOOT BRACKET (OMIT FOR FLANGE)										
DESIGN NUMBER SUBJECT TO CHANGE. INSTAL- LATION DIMENSIONS REMAIN AS SHOWN FOR DESIGN NUM- BERS 10 THRU 19.										
PORT CONNECTIONS F — SAE 4-BOLT FLANGES										
ROTATION (VIEWING FROM SHAFT END) R — RIGHT HAND (CW) ONLY										

PERFORMANCE CHARACTERISTICS  
BASED ON OIL TEMPERATURE OF 120° F. (100 SSU)  
INPUT SPEED — 1800 RPM  
ATMOSPHERIC INLET



STANDARD GRAPHICAL SYMBOL  
FOR FLUID POWER DIAGRAMS





**SPERRY VICKERS**  
TROY, MICHIGAN 48084

**FIXED DISPLACEMENT  
PISTON PUMP  
INLINE TYPE**

**TO BE USED WITH  
OIL-IN-WATER  
EMULSIONS**

**45 GPM, 1800 RPM  
& 2000 PSI**

**FLANGE OR  
FOOT BRACKET  
MOUNTING**

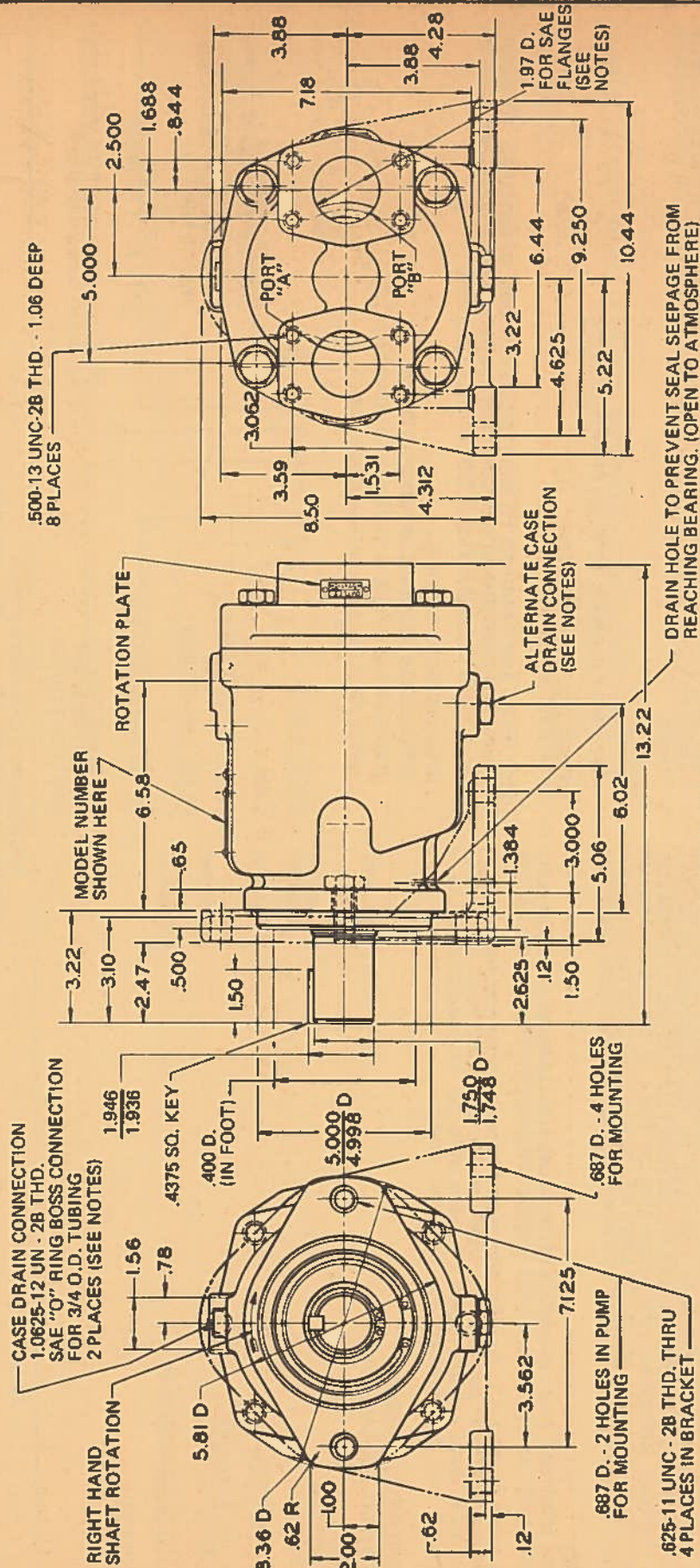
**DWG. NO.  
507802**

**SPERRY VICKERS**  
T.M.

# **FIXED DISPLACEMENT PISTON PUMPS**

MODEL SERIES F6-PFB45  
FOR USE WITH OIL-IN-WATER EMULSIONS

MODEL NUMBER	SHAFT ROTATION	OUTLET PORT
F6-PFB45-RF-1*	R.H.	"A"



F6-PFB45-FRF-1\*

REVISED 1-2-76

507802



## GENERAL DATA

THIS UNIT IS OF THE AXIAL PISTON, FIXED DISPLACEMENT, IN-LINE DESIGN. IT IS RATED AT 45 GPM AT 1800 RPM AND USES OIL-IN-WATER EMULSION FLUID.

## INSTALLATION INFORMATION

HORIZONTAL MOUNTING IS RECOMMENDED TO MAINTAIN NECESSARY CASE FLUID LEVEL. THE CASE DRAIN LINE MUST BE FULL SIZE UNRESTRICTED AND CONNECTED FROM THE UPPERMOST DRAIN PORT DIRECTLY TO THE RESERVOIR IN SUCH A MANNER THAT THE HOUSING REMAINS FILLED WITH FLUID. PIPING OF DRAIN LINE MUST PREVENT SIPHONING. PIPE DRAIN LINE SO THAT IT TERMINATES BELOW RESERVOIR FLUID LEVEL. NO OTHER LINES ARE TO BE CONNECTED TO THIS DRAIN LINE. CAUTION MUST BE EXERCISED TO NEVER EXCEED 5 PSI UNIT CASE PRESSURE.

## STARTING

BEFORE STARTING, FILL CASE WITH SYSTEM FLUID THRU UPPERMOST DRAIN PORT. HOUSING MUST BE KEPT FULL AT ALL TIMES TO PROVIDE INTERNAL LUBRICATION.

WHEN FIRST STARTING, IT MAY BE NECESSARY TO BLEED AIR FROM PUMP OUTLET LINE TO PERMIT PRIMING AND REDUCE NOISE. BLEED BY LOOSENING AN OUTLET CONNECTION UNTIL SOLID STREAM OF FLUID APPEARS. AN AIRBLEED VALVE IS AVAILABLE FOR THIS PURPOSE. SEE DRAWING 521801.

## RATINGS

<b>DISPLACEMENT:</b>	
THEORETICAL MAXIMUM DISPLACEMENT.....	5.76 CU. IN./REV.
OPERATING PRESSURE:	
MAXIMUM.....	2000 PSI
OPERATING SPEED:	
MAXIMUM.....	1800 RPM
<b>FILTRATION</b>	
RETURN LINE.....	25 MICRONS
INLET.....	149 MICRONS
<b>MINIMUM INLET VACUUM</b>	
1800 RPM.....	3 IN. HG.
1500 RPM OR LESS.....	5 IN. HG.
<b>OPERATING TEMPERATURE RECOMMENDED:</b>	100° F. TO 130° F.

SELECT FILTER WITH AN ELEMENT COMPATIBLE WITH THE SPECIFIC EMULSION AND WHICH WILL PERMIT THE OIL AND WATER TO REMAIN EMULSIFIED. CONSULT FLUID AND FILTER MANUFACTURER.

## DRIVE ROTATION

DRIVE ROTATION IS AS TABULATED AND IS NOT REVERSIBLE.

## FLUIDS

AN OIL-IN-WATER EMULSION CONTAINING A 5% CONCENTRATION OF SOLUBLE OIL IS RECOMMENDED (A 8 TO 8 PERCENT CONCENTRATION IS PREFERRED). THE SOLUBLE OIL SHOULD BE A STABLE, HIGH QUALITY SOLUBLE OIL. CHECK FREQUENTLY.

TO ASSURE AN EFFECTIVE EMULSION, THE WATER SHOULD NOT HAVE EXCESSIVE HARDNESS OR HAVE AN ACID NATURE, AND IT SHOULD BE DISTILLED OR DEIONIZED. WHEN PREPARING THE MIXTURE, THE SOLUBLE OIL SHOULD ALWAYS BE ADDED TO THE WATER WHILE MAINTAINING GOOD FLUID AGITATION. THE WATER SHOULD NEVER BE ADDED TO THE SOLUBLE OIL. DO NOT MIX SOLUBLE OIL BRANDS.

PROPER MAINTENANCE OF OIL CONTENT IN THE EMULSION REQUIRES PERIODIC TESTING FOR ALKALINE PH AND OIL CONCENTRATION. THE ALKALINE PH SHOULD BE MAINTAINED AT 8.0 - 9.5 PH.

A REDUCTION OF PREDICTED LIFE FROM THAT OF PETROLEUM OIL SHOULD BE EXPECTED WHEN USING OIL-IN-WATER EMULSIONS. AS A RULE OF THUMB, 50% LIFE REDUCTION CAN BE USED FOR OIL-IN-WATER EMULSIONS COMPARED WITH PETROLEUM OILS.

ALUMINUM ROLLING OIL, CONTAINING 10% BUTYL STEARATE LUBRICITY ADDITIVE MAY ALSO BE USED AS THE FLUID MEDIUM. COMPARING ALUMINUM ROLLING OIL AND OIL-IN-WATER EMULSIONS, BOTH FLUIDS BEAR THE SAME RATINGS AND LIFE EXPECTANCY.

## FLANGES

BOTH INLET AND OUTLET PORTS ACCEPT SPERRY VICKERS' FL1-16-18P.10 OR FL1-16-16W.10 SAE 4-BOLT FLANGES; DATA ON DRAWING I-250700. GRADE 8 SCREWS WITH 120 FT. LB. TORQUE RECOMMENDED.

WEIGHT LBS. (APPROX.)..... 73  
WITH FOOT MTG. .... 87

THIS UNIT IS DESIGNED TO MEET SPECIFICATIONS AS OUTLINED. TO INSURE MAXIMUM UNIT PERFORMANCE, IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION, CONSULT YOUR SPERRY VICKERS APPLICATION ENGINEER IF YOUR:

OPERATING TEMPERATURE IS NOT WITHIN 100° F. TO 130° F.

APPLICATION REQUIRES AN INDIRECT DRIVE.

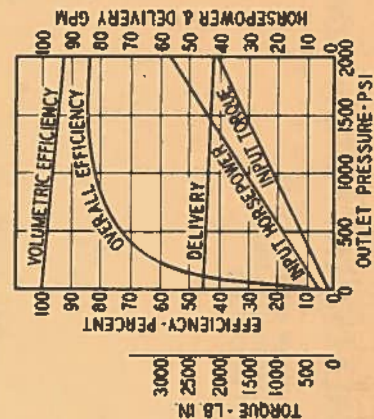
MOUNTING ATTITUDE IS OTHER THAN HORIZONTAL.

NEEDS REQUIRE APPLICATION ASSISTANCE.

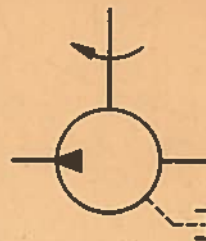
MODEL CODE	F6 - P F B 45 - (F) R F - 1*
PREFIX DESIGNATION FOR SOLUBLE OIL FLUIDS	
PUMPS	
FIXED DISPLACEMENT	
INLINE TYPE DESIGN	
RATING	45 - 45 GPM AT 1800 RPM
MOUNTING TYPE	F - FOOT BRACKET (OMIT FOR FLANGE)
DESIGN NUMBER	SUBJECT TO CHANGE. INSTALLATION DIMENSIONS REMAIN AS SHOWN FOR DESIGN NUMBERS 10 THRU 19.
PORT CONNECTIONS	F - SAE 4 BOLT FLANGE
ROTATION - VIEWING SHAFT END	R - RIGHT HAND

## TYPICAL PERFORMANCE CHARACTERISTICS:

INPUT SPEED - 1800 RPM  
3 IN. HG. VACUUM INLET  
FLUID TEMPERATURE - 120° F.



## STANDARD GRAPHICAL SYMBOL FOR FLUID POWER DIAGRAMS

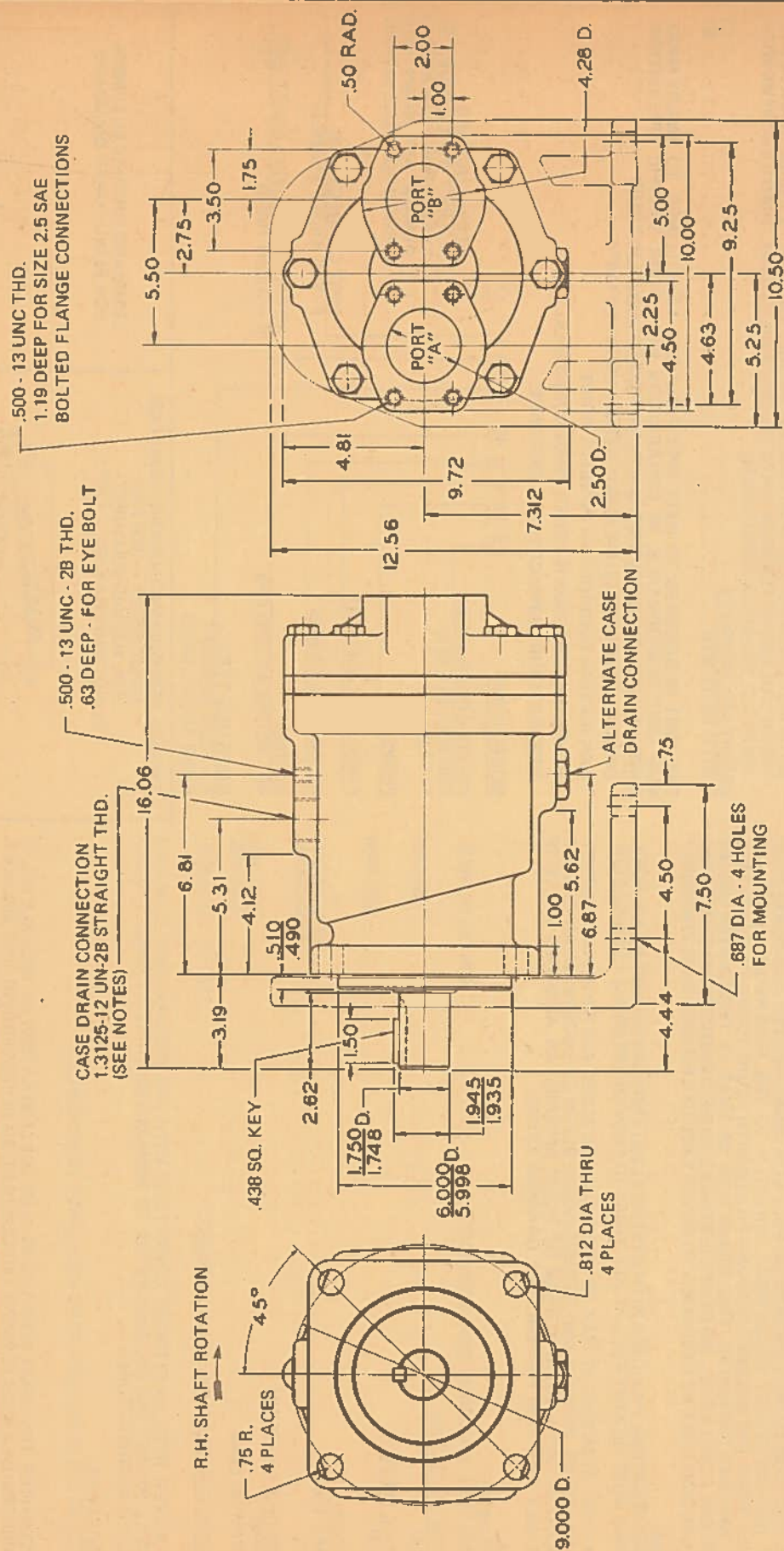




**SPERRY-VICKERS<sup>TM</sup> FIXED DISPLACEMENT PISTON PUMP**

**MODEL SERIES PFB90-31 DESIGN (INLINE TYPE)  
(FOR ALL COMMON HYDRAULIC FLUIDS)  
FLANGE OR FOOT MOUNTING**

MODEL NUMBER	SHAFT ROTATION	OUTLET PORT
PF890-*RF-31	RH	"A"



REVISÉ 3-1-74

507812



#### GENERAL DATA

THIS UNIT IS OF THE AXIAL PISTON, FIXED DISPLACEMENT INLINE DESIGN, WITH MAXIMUM DUTY OF 1800 RPM AND 3000 PSI WITH PETROLEUM OIL. IT HAS SEALS FOR USE WITH ALL COMMONLY USED HYDRAULIC FLUIDS. (SEE CHART BELOW FOR RATINGS WITH THESE FLUIDS.)

#### INSTALLATION INFORMATION

HORIZONTAL MOUNTING IS RECOMMENDED TO MAINTAIN NECESSARY CASE FLUID LEVEL. THE CASE DRAIN LINE MUST BE FULL SIZE UNRESTRICTED AND CONNECTED FROM THE UPPERMOST DRAIN PORT DIRECTLY TO THE RESERVOIR IN SUCH A MANNER THAT THE HOUSING REMAINS FILLED WITH FLUID. PIPING OF DRAIN LINE MUST PREVENT SIPHONING. PIPE DRAIN LINE SO THAT IT TERMINATES BELOW RESERVOIR FLUID LEVEL. NO OTHER LINES ARE TO BE CONNECTED TO THIS DRAIN LINE. CAUTION MUST BE EXERCISED TO NEVER EXCEED 5 PSI UNIT CASE PRESSURE.

#### STARTING

BEFORE STARTING, FILL CASE WITH SYSTEM FLUID THRU UPPERMOST DRAIN PORT. HOUSING MUST BE KEPT FULL AT ALL TIMES TO PROVIDE INTERNAL LUBRICATION.

WHEN FIRST STARTING, IT MAY BE NECESSARY TO BLEED AIR FROM PUMP OUTLET LINE TO PERMIT PRIMING AND REDUCE NOISE. BLEED BY LOOSENING AN OUTLET CONNECTION UNTIL SOLID STREAM OF FLUID APPEARS. AN AIRBLEED VALVE IS AVAILABLE FOR THIS PURPOSE. SEE DRAWING 521601.

#### RATINGS

##### DISPLACEMENT:

THEORETICAL MAXIMUM DISPLACEMENT..... 12.04 CU. IN./REV.

##### RATING CHART

FLUID	MAX. PRESS. PSI	MAX. SPEED RPM	MIN. INLET PRESS.	* LIFE FACTOR
PETROLEUM BASE SAE 10W (MS) OR EQUIVALENT SYNTHETICS	3000	1800	SEE CURVE	100%
COMMON WATER-OIL EMULSION	2500	1800		75 TO 100%
WATER GLYCOL	2000	1800		70 TO 80%
WATER (95%) SOLUBLE OIL (5%)	2000	1200	5 IN. HG. VAC (12.2 PSIA)	40 TO 60%
ALUMINUM ROLLING OILS	2000	1200		50%

\* LIFE FACTOR (PERCENT OF EXPECTED LIFE WITH PETROLEUM BASE FLUIDS)

#### FILTRATION

PRESSURE OR RETURN LINE RECOMMENDED..... 25 MICRONS  
FOR SOLUBLE OIL SELECT FILTER WITH AN ELEMENT COMPATIBLE WITH THE  
SPECIFIC EMULSION AND WHICH WILL PERMIT THE OIL AND WATER TO REMAIN  
EMULSIFIED. CONSULT FLUID AND FILTER MANUFACTURER.

OPERATING TEMPERATURE (RECOMMENDED)..... 100° TO 130° F.  
OIL-IN-WATER EMULSION (MAXIMUM)..... 120° F.

DRIVE ROTATION  
RIGHT HAND ONLY.

#### FLUIDS

##### PETROLEUM OIL

CLEAN PETROLEUM ANTIWEAR INDUSTRIAL HYDRAULIC OIL OR AUTOMOTIVE CRANKCASE OIL DESIGNATED SC, SD OR SE. RUNNING VISCOSITY RANGE 70-250 SUS. OPERATING TEMPERATURE 120° F RECOMMENDED, 150° F USUAL MAXIMUM. REFER TO DATA SHEET I-286-S (SECTION L) FOR HYDRAULIC OIL RECOMMENDATIONS.

##### SOLUBLE OIL

AN OIL IN WATER EMULSION CONTAINING A 5% (6% TO 8% PREFERRED) CONCENTRATION OF SOLUBLE OIL IS RECOMMENDED. THE SOLUBLE OIL SHOULD BE A HIGH STABILITY, HIGH QUALITY SOLUBLE OIL.

TO INSURE AN EFFECTIVE EMULSION THE WATER SHOULD NOT HAVE EXCESSIVE HARDNESS OR HAVE AN ACID NATURE. PREFERABLY THE WATER SHOULD BE DISTILLED OR DEIONIZED. WHEN MIXING THE SOLUTION THE SOLUBLE OIL SHOULD ALWAYS BE ADDED TO THE WATER MAINTAINING GOOD FLUID AGITATION. THE WATER SHOULD NEVER BE ADDED TO THE SOLUBLE OIL.

PROPER MAINTENANCE OF OIL CONTENT IN THE EMULSION REQUIRES PERIODIC TESTING OF SAMPLES FROM THE SYSTEM FOR ALKALINE PH (A SLIGHTLY ALKALINE 8 - 9% PH IS RECOMMENDED) AND OIL CONCENTRATION. FOLLOW SPECIFIC INSTRUCTIONS OF THE OIL SUPPLIER.

ALUMINUM ROLLING OIL (OF THE MINERAL SEAL TYPE) CONTAINING 10% BUTYL STEARATE LUBRICITY ADDITIVE MAY ALSO BE USED AS THE FLUID MEDIUM.

##### FIRE-RESISTANT FLUID

MOST FIRE-RESISTANT FLUIDS ARE APPROVED FOR USE WITH THIS PUMP, PROVIDED THAT RECOMMENDED OPERATING TEMPERATURE, INLET CONDITION, PROPER VISCOSITY AND MAINTENANCE OF FLUID ARE OBSERVED. SEE TABULATION.

#### FLANGES

BOTH INLET AND OUTLET PORTS ACCEPT VICKERS' FL1-20-20P-1D OR FL1-20-20W-10 SAE 4-BOLT FLANGES; DATA ON DRAWING I-250700.

WEIGHT LBS. (APPROX.)..... 146

THIS UNIT IS DESIGNED TO MEET SPECIFICATIONS AS OUTLINED. TO INSURE MAXIMUM UNIT PERFORMANCE, IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION, CONSULT YOUR VICKERS APPLICATION ENGINEER IF YOUR:

OPERATING TEMPERATURE IS NOT WITHIN 100° F. TO 120° F.

APPLICATION REQUIRES AN INDIRECT DRIVE.

MOUNTING ATTITUDE IS OTHER THAN HORIZONTAL.

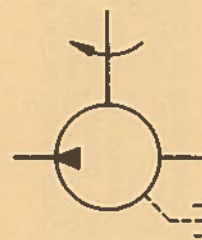
FLUID DOES NOT MEET THE SPECIFICATIONS SHOWN ON DATA SHEET I-286-S.  
NEEDS REQUIRE APPLICATION ASSISTANCE.



# **MODEL CODE**

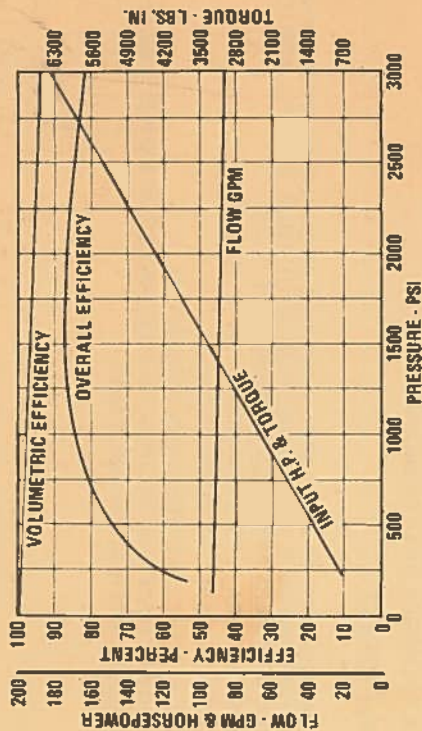
**PUMP**  
 P F B 90 - F \* F - 31  
 FIXED DISPLACEMENT  
 INLINE TYPE DESIGN  
 RATING  
 90 - 90 GPM AT 1800 RPM (SEE DRAWING 507812-1 FOR MAX. SPEED RATINGS)  
 MOUNTING TYPE  
 F - FOOT BRACKET (OMIT FOR FLANGE)  
 DESIGN NUMBER  
 SUBJECT TO CHANGE. IN-  
 STALLATION DIMENSIONS  
 REMAIN AS SHOWN FOR  
 DESIGN NUMBERS 30 THRU  
 39.  
 PORT CONNECTIONS  
 F - SAE 4 BOLT FLANGES  
 ROTATION - VIEWING SHAFT END  
 R - RIGHT HAND (CW) ONLY

## **STANDARD GRAPHICAL SYMBOL FOR FLUID POWER DIAGRAMS**

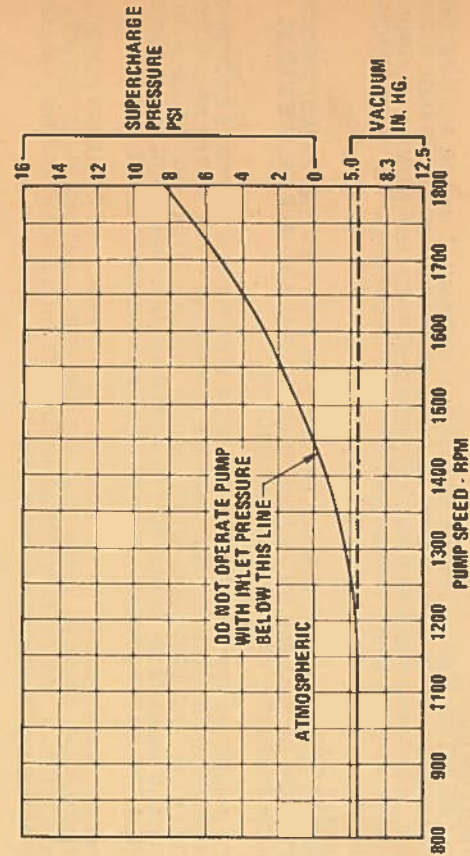


## **PERFORMANCE CHARACTERISTICS**

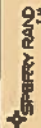
BASED ON OIL TEMPERATURE OF 120° F. (100 SUS) PETROLEUM,  
 INPUT SPEED - 1800 RPM, INLET PRESSURE - 8 PSI



## **MINIMUM INLET PRESSURE RECOMMENDED**

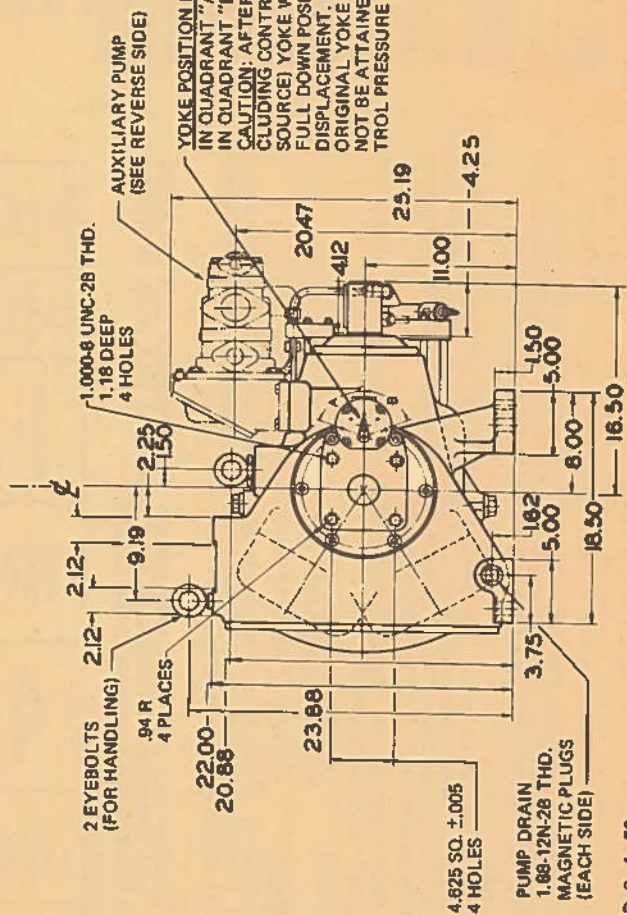
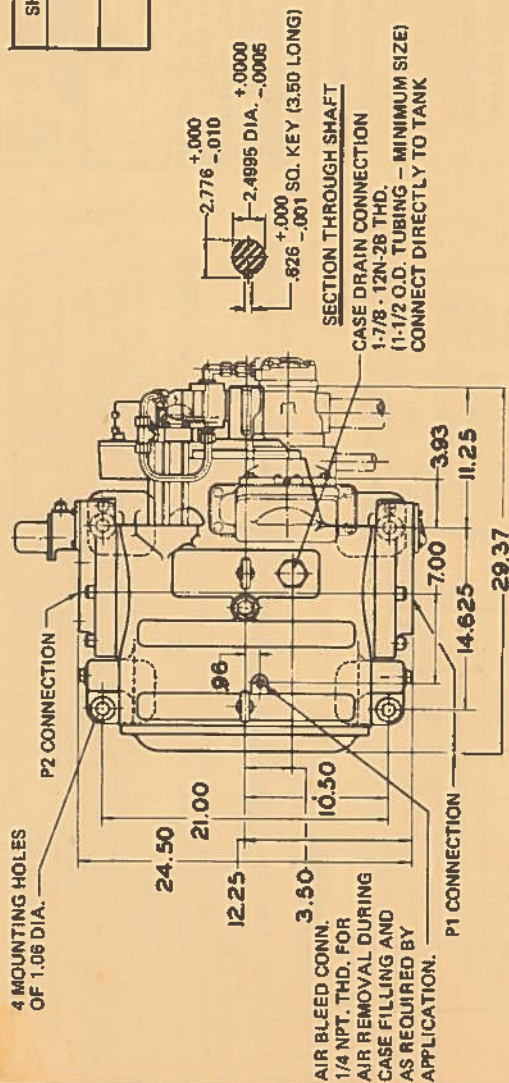






# VICKERS® VARIABLE DISPLACEMENT PISTON PUMPS

MODEL SERIES PVA120 & PVA150  
WITH ELECTRO-HYDRAULIC CONTROL



YOKE POSITION INDICATOR  
IN QUADRANT "A" YOKE IS UP.  
IN QUADRANT "B" YOKE IS DOWN.  
CAUTION: AFTER SHUT-DOWN (INCLUDING CONTROL PRESSURE SOURCE) YOKE WILL DRIFT TO FULL DOWN POSITION MAXIMUM DISPLACEMENT. UPON RE-START, ORIGINAL YOKE POSITION WILL NOT BE ATTAINED UNTIL CONTROL PRESSURE IS AVAILABLE.

ARROW INDICATES DIRECTION OF RIGHT HAND (CLOCKWISE) ROTATION

ELECTRO-HYDRAULIC CONTROL (SEE PAGE 3)

SHAFT ROTATION	YOKE POSITION	OUTLET PORT	INLET PORT
CLOCKWISE	UP	P1	P2
CLOCKWISE	DOWN	P2	P1
COUNTER-CLOCKWISE	UP	P2	P1
COUNTER-CLOCKWISE	DOWN	P1	P2

VICKERS DIVISION  
OF SPERRY RAND CORPORATION  
TROY, MICHIGAN 48064

PUMP  
PISTON TYPE

VARIABLE  
DISPLACEMENT

ELECTRO-HYDRAULIC  
CONTROL

PVA120  
TO 180 GPM  
AND 5000 PSI  
OUTPUT

PVA150  
TO 150 GPM  
AND 3000 PSI  
OUTPUT

FOOT  
MOUNTING

DWG. NO.  
509300

REVISED 9-1-72



PUMPS ARE OF ANGLE-TYPE, VARIABLE DISPLACEMENT, AXIAL PISTON DESIGN. THE PVA120 WILL PRODUCE FLOWS TO 180 GPM AT 1800 RPM AND HAS PRESSURE RATINGS TO 5000 PSI MAXIMUM. THE PVA150 OUTPUT IS 150 GPM AT 1200 RPM AND PRESSURES UP TO 3000 PSI.

ELECTRO-HYDRAULIC CONTROL PROVIDES PRECISE PUMP DISPLACEMENT CONTROL FOR ELECTRICAL REMOTE CONTROL. SEE DRAWING 508400 FOR THE HYDRO-MECHANICAL CONTROL. 509500 FOR THE PRESSURE COMPENSATOR AND 509600 FOR THE HANDWHEEL.

## INSTALLATION

A FULL SIZE UNRESTRICTED DRAIN LINE (1.50 O.D. TUBE OR EQUIVALENT) MUST BE CONNECTED DIRECTLY FROM THE CASE DRAIN CONNECTION TO A LOCATION BELOW THE LOWEST FLUID LEVEL IN THE SYSTEM RESERVOIR. PRESSURE SURGES AT THE CASE DRAIN CONNECTION ON PUMP SHOULD NOT EXCEED 20 PSI.

CIRCUIT MUST PROVIDE FOR CIRCULATION OF COOL OIL THROUGH PUMP CASE FROM BOTTOM TO TOP DRAIN CONNECTION.

PVA 120 SERIES:  
1200 RPM - CIRCULATE 3 GPM  
1800 RPM - CIRCULATE 5 GPM

PVA 150 SERIES:  
1200 RPM - CIRCULATE 3 GPM

CASE PRESSURE OF 10 PSI  $\pm$  5 MUST BE MAINTAINED WHEN OPERATING AT SPEEDS ABOVE 1200 RPM. IF NECESSARY, 5 OR 10 PSI CHECK VALVE MAY BE USED IN THE CASE-COOLING OIL CIRCUIT TO OBTAIN CASE PRESSURE.

## STARTING

BEFORE START-UP FILL PUMP CASE WITH SYSTEM FLUID THROUGH CASE DRAIN CONNECTION. (USE AIRBLEED PROVIDED) CASE MUST REMAIN FULL OF FLUID TO PROVIDE INTERNAL LUBRICATION. (AVOID SIPHONING ACTION.)

## OPERATING SPECIFICATIONS

MODEL NO.	THEO. RETICAL MAX. DISP. CU. IN. / REV.	GPM DELIVERY		DRIVE SPEED RPM		PRESSURE PSI	VOL. EFF. AT MAX. DISP., PSI & RATED RPM	OVERALL EFF. AT MAX. DISP., PSI & RATED RPM
		RATED	MAX.	RATED	MAX.			
PVA120	23.71	120	180	1200	1800	3000	96%	94%
PVA150	28.96	150	150	1200	1200	2500		

NOTE: VICKERS ENGINEERING APPROVAL IS REQUIRED FOR ALL APPLICATIONS WITH SPEEDS ABOVE 1200 RPM.

## FILTRATION RECOMMENDED WITH ATMOSPHERIC INLET

INLET LINE: ..... 74 MICRONS  
IN ADDITION, 25 MICRON PARTIAL FLOW FILTRATION (20% MINIMUM) OF THE OIL RETURNING TO TANK SHOULD BE USED.

WITH SUPERCHARGE INLET

25 MICRON FILTER TO BE USED ON THE PISTON PUMP INLET.

CIRCULATING GASE-COOLING OIL, ..... 25 MICRONS

## PUMP INLET CONDITIONS

FOR APPLICATIONS OVER 1200 RPM, FOR SYNTHETIC FIRE RESISTANT FLUIDS, (WITH ENGINEERING REVIEW AND COMMENTS), OR CROSS CENTER APPLICATIONS, 100 PSI SUPERCHARGE PRESSURE IS PREFERRED. NOTE THAT INLET PRESSURE REDUCES SOUND.

MODEL	ONE SIDE OF CENTER		CROSS CENTER		*SYNTHETIC FIRE RESISTANT FLUIDS
	TO	TO	TO	TO	
PVA120	1200 RPM	1800 RPM	1200 RPM	1800 RPM	1200 RPM ONLY
	4" HG	50 PSI	25 PSI	75 PSI	100 PSI
PVA150	4" HG	NOT APPROVED	25 PSI	NOT APPROVED	100 PSI

\*COMMONLY USED INDUSTRIAL SYNTHETIC FIRE RESISTANT FLUIDS ONLY. NO WATER GLYCOL, WATER-IN-OIL EMULSION OR SOLUBLE OIL-IN-WATER SOLUTIONS. (AIR PRESURIZATION OF RESERVOIR IS NOT TO BE USED.)

## MINIMUM OUTLET PRESSURE

A MINIMUM PRESSURE OF 150 PSI AT THE PUMP OUTLET IS RECOMMENDED.

NOTE: IF SYSTEM PRESSURE IS IMPOSED ON THE PUMP INLET AND OUTLET PORTS AT THE SAME TIME, EVEN FOR A SHORT DURATION AS ON CROSS-CENTER PUMPS, PUMP SHOULD HAVE A MOTOR VALVE PLATE. CONTACT VICKERS APPLICATION ENGINEER FOR ASSISTANCE. (TOTAL PRESSURE NOT TO EXCEED PUMP RATING.)

## DRIVE ROTATION

EITHER CLOCKWISE OR COUNTERCLOCKWISE ROTATION IS AVAILABLE. INDICATE ROTATION WHEN ORDERING.

## INPUT HORSEPOWER

$$\text{APPROX. INPUT HP REQ'D} = \frac{\text{FLOW} \times \text{PRESSURE}}{1714} \times \frac{1}{\text{OVERALL EFFICIENCY}} + \text{AUX. PUMP INPUT HP}$$

(ACTUAL HP INPUT REQUIRED DEPENDS ON DUTY CYCLE)

## FLUIDS

PETROLEUM OILS - SELECT ANTIWEAR TYPE INDUSTRIAL HYDRAULIC OILS OR AUTOMOTIVE CRANKCASE OILS WITH A NOMINAL VISCOSITY OF 215 TO 315 SUS AT 100° F. AND HAVING LETTER DESIGNATION "SC, SD, OR SE" PER SAE TECHNICAL REPORT J188. OPERATING VISCOSITY RANGE IS 70 TO 250 SUS. OPERATING TEMPERATURE OF 120° F. TYPICAL TO 180° F. MAXIMUM IS RECOMMENDED. REFER TO DATA SHEET I-286-S (SECTION L) FOR HYDRAULIC OIL RECOMMENDATIONS.

WEIGHT (PUMP AND CONTROL DRY) ..... APPROX. 1150 LBS.

THESE UNITS ARE DESIGNED TO MEET SPECIFICATIONS AS OUTLINED. TO INSURE MAXIMUM UNIT PERFORMANCE, IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION, CONSULT YOUR APPLICATION ENGINEER IF YOUR:

PRESSURE REQUIREMENTS ARE ABOVE RATED PRESSURES.

SPEED IS ABOVE RATED RPM.

CYCLE REQUIRES CONTROL TO SHIFT PUMP YOKE FULL STROKE IN LESS THAN THREE SECONDS.

SYSTEM REQUIRES FIRE-RESISTANT FLUID.

OPERATING TEMPERATURE IS NOT WITHIN 100° F. TO 150° F. WITH PROPER APPLICATION AND FLUID CONSIDERATION, A GREATER TEMPERATURE RANGE IS PERMISSIBLE. OIL VISCOSITY AT OPERATING TEMPERATURE IS NOT WITHIN 100 TO 250 SSU.

OIL VISCOSITY AT START-UP IS IN EXCESS OF 1000 SSU.

APPLICATION REQUIRES AN INDIRECT DRIVE.

NEEDS REQUIRE APPLICATION ASSISTANCE.

MOUNTING IS OTHER THAN HORIZONTAL.

## AUXILIARY PUMPS

TO SUPPLY HYDRAULIC POWER FOR THE ELECTRO-HYDRAULIC CONTROL, OR OTHER PURPOSES, PVA SERIES PUMPS PROVIDE FOR AN OPTIONAL AUXILIARY PUMP. THESE ARE MOUNTED ON THE HOUSING AND DRIVEN BY AN INTERNAL 1:1 DRIVE FROM THE MAIN PUMP SHAFT. EITHER SINGLE OR DOUBLE VANE PUMPS MAY BE SPECIFIED. PUMPS AND MOUNTING KITS ARE AS TABULATED.

## AUXILIARY PUMPS AVAILABLE †

MODEL	GPM APPROX. AT 1200 RPM			MOUNTING KIT	INST. DRAWG.
	SHAFT END	HEAD END	HEAD END		
SINGLE PUMPS					
	V210 - 1A-12-S214-LH	2-5-6-8W-9W-11W		293265	I-236693
	V330 - 1A-11-S214-LH	15-19-24		293266	I-236694
	V430 - 1A-11-S214-LH	28-36		293264	I-236695
DOUBLE PUMPS					
	V2230 - 1CA-20-S214-LH	2-5-6-8W-9W-11W	2-5-6-8W-9W-11W	293266	I-248700
	V3230 - 1CA-10-S214-LH	15-19-24	2-5-6-8W-9W-11W	293264	I-248701
	V4240 - 1CA-10-S214-LH	28-36	2-5-6-8W-9W-11W	293264	I-248702

## NOTE:

1. AUXILIARY PUMP'S ROTATION IS OPPOSITE THAT OF MAIN PUMP - ADD "LH" SUFFIX TO AUXILIARY PUMP ONLY FOR PVA - S MODELS.

12. HORSEPOWER INPUT TO THE AUXILIARY PUMP IS LIMITED TO 10 HP AT 1200 RPM AND 15 HP AT 1800 RPM.

CONTINUED ON NEXT PAGE.

509300-1



3. WHEN AN AUXILIARY PUMP IS SPECIFIED, THE OUTLET OF THE SMALLEST PUMPING ELEMENT WILL NORMALLY BE CONNECTED TO THE CONTROL SYSTEM. SEE NEXT PAGE FOR FLOW AND PRESSURE.

4. INLET CONNECTION AND INTAKE STRAINER SHOULD BE PROVIDED FOR THE AUXILIARY PUMP. DRAWING 500800 (ON T10 POWER UNITS) AND DRAWING 522150 (ON INTAKE FILTERS) WILL PROVIDE GENERAL INFORMATION. SPECIFIC REQUIREMENTS DEPEND ON AUXILIARY PUMP SELECTED.

#### HOW TO ORDER

##### PUMP

ALL PUMPS	ROTATION	DISPLACEMENT	DESIGN NO.
PVA120 OR PVA150	-R (RIGHT HAND) OR -L (LEFT HAND)	§ ONE SIDE OF CENTER) OR □ (BOTH SIDES OF CENTER)	SUBJECT TO CHANGE. INSTALLATION DIMENSIONS REMAIN THE SAME AS SHOWN FOR DESIGN NUMBERS 10 TO 19.

EXAMPLE: PVA120 - RS - 13

##### CONTROL

ALL CONTROLS	USED ON	STROKE CONDITION	TYPE	SINGLE AND TWO STAGE SERVO VALVES	SIZE	DESIGN NO.
CA	P (PUMP)	-D (BOTH SIDES OF CENTER) OR -§ (ONE SIDE OF CENTER) PUMP Yoke DOWN	B (ELECTRO-HYD. WITH POTENTIOMETER Yoke FEEDBACK)	SC4-03 "C" = * 40 OHMS SA4-03 "B" = A	2	-11

EXAMPLE: CAP - SRC7 - 11

\* OTHER RESISTANCE COILS ARE AVAILABLE. CONSULT APPLICATION ENGINEER

▲ "B" - SA4-03 SERVO VALVE MUST BE ORDERED SEPARATELY. SPECIFY LINKAGE AND TORQUE MOTOR COIL RESISTANCE.

SYSTEM FLANGES: INLET AND OUTLET FLANGES OF THE ELL-WELDING NECK TYPE, 3-1/2 INCH PIPE SIZE (NOMINAL), ARE AVAILABLE. MODEL NUMBER FL2-120-288WL-10 (2 REQ'D) IS SHOWN ON DRAWING 522910 SECTION L.

S-569 FEATURE (SINGLE SIDE OF CENTER ONLY)

WHEN THE "S-569" PUMP IS MOUNTED HORIZONTALLY AS SHOWN, THE YOKE OPERATION IS IN THE UPPER QUADRANT. THIS "S-569" MUST BE INDICATED ON THE ORDER IN BOTH THE MODEL NUMBER FOR THE PUMP AND THE CONTROL. (EXAMPLE BELOW ON HOW TO ORDER.) UNDER ABOVE DUTY CONDITIONS, THE "S-569" FEATURE PERMITS THE PUMP YOKE TO SETTLE TO THE ZERO DISPLACEMENT POSITION (CENTER) WHEN PUMP AND CONTROL POWER ARE OFF. WITH THE PUMP YOKE IN THE CENTER POSITION AND CONTROL SET FOR NO FLOW, STARTING IS SIMPLIFIED. THE PUMP OUTLET NEED NOT BE BYPASSED TO TANK WHILE CONTROL POWER SYSTEM IS BEING STARTED.

EXAMPLE OF ORDER: CAP-SRC7-11-S569

ONE (1) PVA150 PUMP ASSY INCL:

ONE (1) PVA150-LS-13-S569

ONE (1) CAP-SRC7-11-S569

ONE (1) V3230-15-5-1C-12-S214

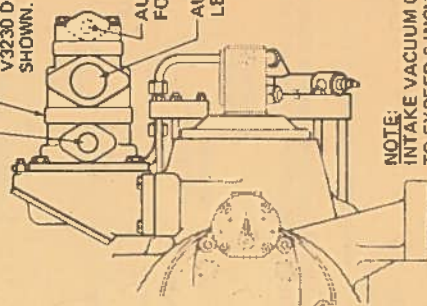
ONE (1) 293264 MOUNTING KIT

TWO (2) FL2-120-288WL-10 FLANGES

## AUXILIARY PUMP

### (DOUBLE PUMP SHOWN)

AUX. PUMP OUTLET NO. 1  
REQUIRES SEPARATE  
LIEF VALVE AND FILTER  
AUXILIARY VANE PUMP  
AND MOUNTING KIT.  
V3230 DOUBLE PUMP  
SHOWN.



NOTE:  
INTAKE VACUUM OF AUXILIARY PUMP IS NOT  
TO EXCEED 6 INCHES OF MERCURY FOR  
PETROLEUM OIL.

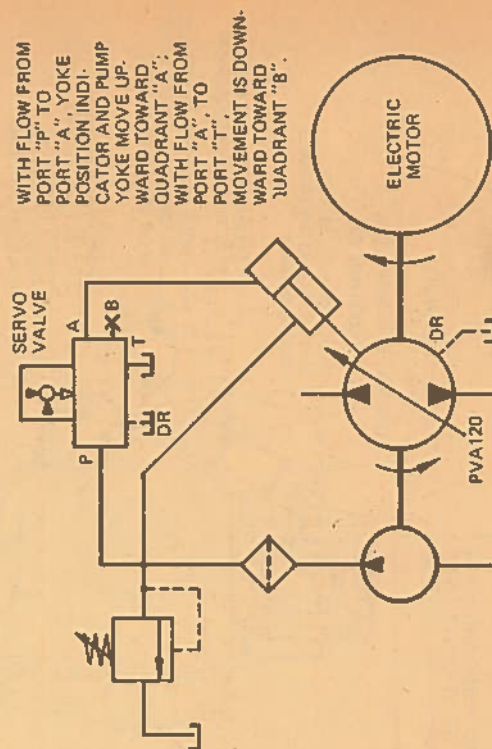


FIGURE NO. 3. SCHEMATIC HYDRAULIC CIRCUIT OF MAIN PUMP, AUXILIARY PUMP AND CONTROL.

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**CONTROL**

**CONTROL**

## CONTROLS

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## CONTROL

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## FIGURES

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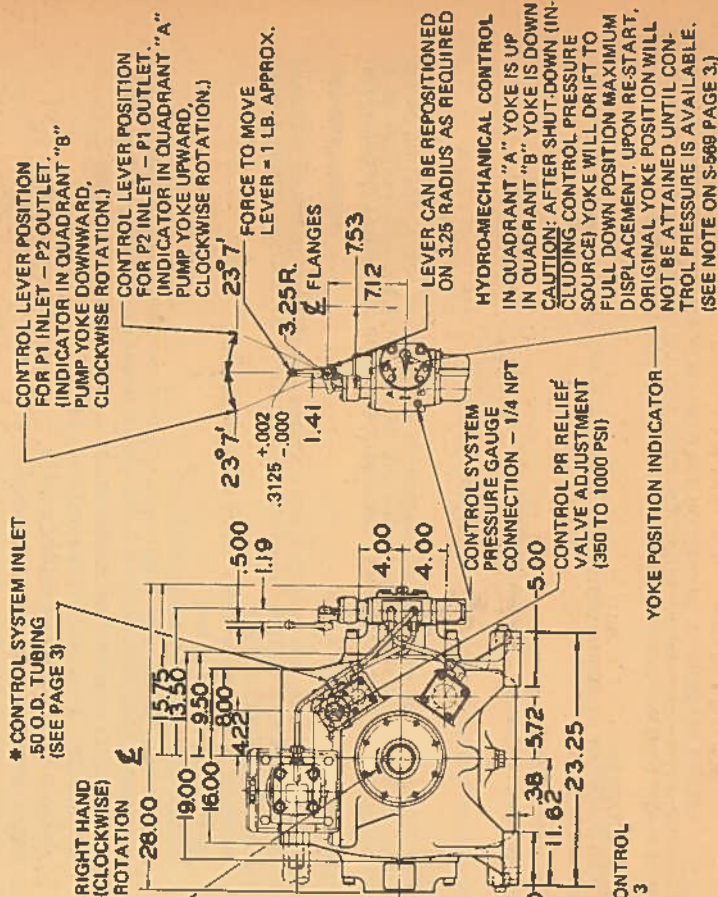
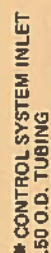
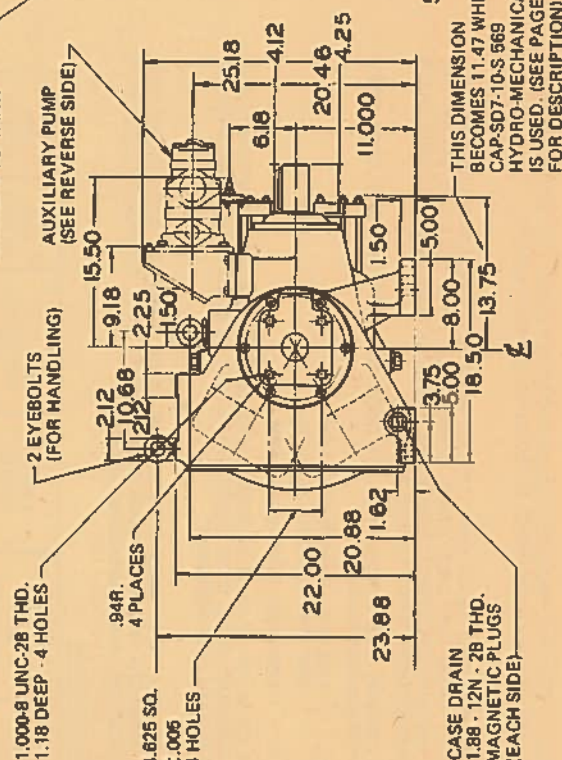
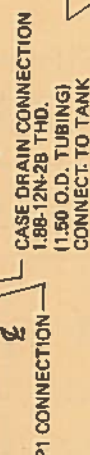
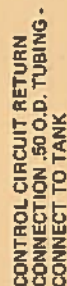
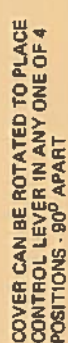


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**VICKERS® VARIABLE DISPLACEMENT PISTON PUMPS**

**MODEL SERIES PVA 120 AND PVA 150  
WITH HYDRO-MECHANICAL CONTROL**



SHAFT ROTATION	YOKE POSITION	OUTLET PORT	INLET PORT
CLOCKWISE	UP	P1	P2
	DOWN	P2	P1
COUNTER-CLOCKWISE	UP	P2	P1
	DOWN	P1	P2

REVISED 5-3-71

509400

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# GENERAL DATA

PUMPS ARE OF ANGLE-TYPE, VARIABLE DISPLACEMENT, AXIAL PISTON DESIGN. THE PVA120 WILL PRODUCE FLOWS TO 180 GPM AT 1800 RPM AND HAS PRESSURE RATINGS TO 5000 PSI MAXIMUM. THE PVA150 OUTPUT IS 150 GPM AT 1200 RPM AND PRESSURES UP TO 3000 PSI.

HYDRO-MECHANICAL CONTROL PROVIDES HYDRAULIC POWER BOOST FOR ADJUSTING PUMP DISPLACEMENT. LESS THAN 1 LB. OF FORCE IS REQUIRED TO MOVE LEVER.

## INSTALLATION

A FULL SIZE UNRESTRICTED DRAIN LINE (1.50 O.D. TUBE OR EQUIVALENT) MUST BE CONNECTED DIRECTLY FROM THE CASE DRAIN CONNECTION TO A LOCATION BELOW THE LOWEST FLUID LEVEL IN THE SYSTEM RESERVOIR. PRESSURE SURGES AT THE CASE DRAIN CONNECTION ON PUMP SHOULD NOT EXCEED 20 PSI.

CIRCUIT MUST PROVIDE FOR CIRCULATION OF COOL OIL THROUGH PUMP CASE FROM BOTTOM TO TOP DRAIN CONNECTION.

PVA 120 SERIES:  
1200 RPM - CIRCULATE 3 GPM  
1800 RPM - CIRCULATE 5 GPM

PVA 150 SERIES:  
1200 RPM - CIRCULATE 3 GPM

CASE PRESSURE OF 10 PSI ± 5 MUST BE MAINTAINED WHEN OPERATING AT SPEEDS ABOVE 1200 RPM. IF NECESSARY, 5 OR 10 PSI CHECK VALVE MAY BE USED IN THE CASE-COOLING OIL CIRCUIT TO OBTAIN CASE PRESSURE.

## STARTING

BEFORE START-UP FILL PUMP CASE WITH SYSTEM FLUID THROUGH CASE DRAIN CONNECTION. (USE AIRBLEED PROVIDED) CASE MUST REMAIN FULL OF FLUID TO PROVIDE INTERNAL LUBRICATION. (AVOID SIPHONING ACTION.)

## OPERATING SPECIFICATIONS

MODEL NO.	THEO-RETICAL MAX. DISP. CU. IN./REV.	GPM DELIVERY		DRIVE SPEED RPM		PRESSURE PSI	VOL. EFF. AT MAX. DISP. MAX. PSI & RATED RPM	OVERALL EFF. AT MAX. DISP. MAX. PSI & RATED RPM
		RATED	MAX.	RATED	MAX.			
PVA120	23.71	120	180	1200	1800	3000	96%	94%
PVA150	28.96	150	150	1200	1200	2500		

NOTE: VICKERS ENGINEERING APPROVAL IS REQUIRED FOR ALL APPLICATIONS WITH SPEEDS ABOVE 1200 RPM.

## FILTRATION RECOMMENDED

WITH ATMOSPHERIC INLET  
IN ADDITION, 25 MICRON PARTIAL FLOW FILTRATION (20% MINIMUM) OF THE OIL RETURN-ING TO TANK SHOULD BE USED.  
25 MICRON FILTER TO BE USED ON THE PISTON PUMP INLET.  
CIRCULATING CASE-COOLING OIL..... 25 MICRONS

## PUMP INLET CONDITIONS

FOR APPLICATIONS OVER 1200 RPM, FOR SYNTHETIC FIRE RESISTANT FLUIDS, (WITH ENGINEERING REVIEW AND COMMENTS) OR CROSS CENTER APPLICATIONS, 100 PSI SUPER-CHARGE PRESSURE IS PREFERRED. NOTE THAT INLET PRESSURE REDUCES SOUND.

MODEL	ONE SIDE OF CENTER		CROSS CENTER		"SYNTHETIC FIRE RESISTANT FLUIDS"	
	1200 RPM	TO 1800 RPM	1200 RPM	TO 1800 RPM	1200 RPM ONLY	
PVA120	4" HG	50 PSI	25 PSI	75 PSI	100 PSI	
PVA150	4" HG	NOT APPROVED	25 PSI	NOT APPROVED	100 PSI	

\*COMMONLY USED INDUSTRIAL SYNTHETIC FIRE RESISTANT FLUIDS ONLY. NO WATER GLYCOL, WATER-IN-OIL EMULSION OR SOLUBLE OIL-IN-WATER SOLUTIONS.

# MINIMUM OUTLET PRESSURE

A MINIMUM PRESSURE OF 150 PSI AT THE PUMP OUTLET IS RECOMMENDED.

NOTE: IF SYSTEM PRESSURE IS IMPOSED ON THE PUMP INLET AND OUTLET PORTS AT THE SAME TIME, EVEN FOR A SHORT DURATION, PUMP SHOULD PROBABLY HAVE A MOTOR VALVE PLATE. CONTACT VICKERS APPLICATION ENGINEER FOR ASSISTANCE.

DRIVE ROTATION  
EITHER CLOCKWISE OR COUNTERCLOCKWISE ROTATION IS AVAILABLE. INDICATE ROTATION WHEN ORDERING.

## INPUT HORSEPOWER

$$\text{APPROX. INPUT HP REQ'D} = \frac{\text{FLOW} \times \text{PRESSURE}}{1714} \times \frac{1}{\text{OVERALL EFFICIENCY}} + \text{AUX. PUMP INPUT HP}$$

(ACTUAL HP INPUT REQUIRED DEPENDS ON DUTY CYCLE)

## FLUID

CLEAN PETROLEUM OIL OF VISCOSITY RANGE 225 TO 325 SSU AT 100° F. MEETING OR EXCEEDING LUBRICATING QUALITIES OF SAE OIL OF API SERVICE CLASSIFICATION MS IS RECOMMENDED. REFER TO DATA SHEET I-286S (SECTION L) FOR ADDITIONAL INFORMATION.

WEIGHT (PUMP AND CONTROL-DRY)..... APPROX. 1150 LBS.

THESE UNITS ARE DESIGNED TO MEET SPECIFICATIONS AS OUTLINED. TO INSURE MAXIMUM UNIT PERFORMANCE, IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION, CONSULT YOUR APPLICATION ENGINEER IF YOUR:

PRESSURE REQUIREMENTS ARE ABOVE RATED PRESSURES.

SPEED IS ABOVE RATED RPM.

SYSTEM REQUIRES FIRE-RESISTANT FLUID.

OPERATING TEMPERATURE IS NOT WITHIN 100° F. TO 150° F. WITH PROPER APPLICATION AND FLUID CONSIDERATION, A GREATER TEMPERATURE RANGE IS PERMISSIBLE.

OIL VISCOSITY AT OPERATING TEMPERATURE IS NOT WITHIN 100 TO 250 SSU.

OIL VISCOSITY AT START-UP IS IN EXCESS OF 1000 SSU.

APPLICATION REQUIRES AN INDIRECT DRIVE.

NEEDS REQUIRE APPLICATION ASSISTANCE.

MOUNTING IS OTHER THAN HORIZONTAL.

## AUXILIARY PUMPS

TO SUPPLY HYDRAULIC POWER FOR THE HYDRO-MECHANICAL CONTROL, OR OTHER PURPOSES, PVA SERIES PUMPS PROVIDE FOR AN OPTIONAL AUXILIARY PUMP. THESE ARE MOUNTED ON THE HOUSING AND DRIVEN BY AN INTERNAL 1:1 DRIVE FROM THE MAIN PUMP SHAFT. EITHER SINGLE OR DOUBLE VANE PUMPS MAY BE SPECIFIED. PUMPS AND MOUNTING KITS ARE AS TABULATED.

MODEL	AUXILIARY PUMPS AVAILABLE †			MOUNTING KIT	INST. DRWG.
	GPM APPROX. AT 1200 RPM	SHAFT END	HEAD END		
SINGLE PUMPS	V210-1A-12-S214-LH	2-5-6-8W-9W-11W		293265	I-236693
	V330-1A-11-S214-LH	15-19-24		293266	I-236694
	V430-1A-11-S214-LH	28-36		293264	I-236695
DOUBLE PUMPS	V2230-1A-10-S214-LH	2-5-6-8W-9W-11W	2-5-6-8W-9W-11W	293268	I-248700
	V3230-1A-10-S214-LH	15-19-24	2-5-6-8W-9W-11W	293264	I-248701
	V4240-1A-10-S214-LH	28-36	2-5-6-8W-9W-11W	293264	I-248702

## NOTE:

1. AUXILIARY PUMP'S ROTATION IS OPPOSITE THAT OF MAIN PUMP - ADD "LH" SUFFIX TO AUXILIARY PUMP ONLY FOR PVA\*\*B MODELS.

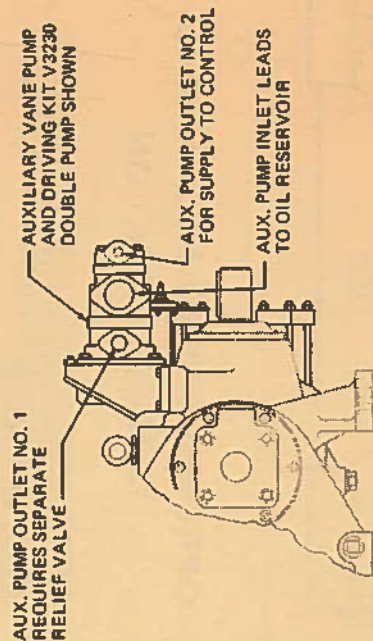
12. HORSEPOWER INPUT TO THE AUXILIARY PUMP IS LIMITED TO 10 HP AT 1200 RPM AND 15 HP AT 1800 RPM.

3. WHEN AN AUXILIARY PUMP IS SPECIFIED, THE OUTLET OF THE SMALLEST PUMPING ELEMENT WILL NORMALLY BE CONNECTED TO THE CONTROL SYSTEM. (SEE CONTROL NOTE ON NEXT PAGE.)

4. INLET CONNECTION AND INTAKE STRAINER SHOULD BE PROVIDED FOR THE AUXILIARY PUMP. DRAWING 500800 (ON T10 POWER UNITS) AND DRAWING 522150 (ON INTAKE FILTERS) WILL PROVIDE GENERAL INFORMATION.

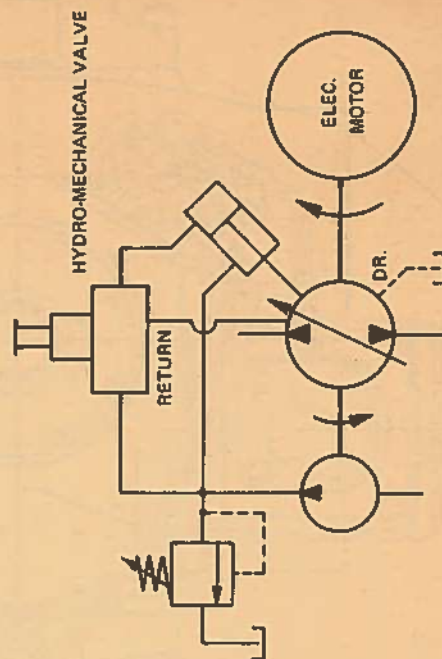


# AUXILIARY PUMP (DOUBLE PUMP SHOWN)



NOTE:  
INTAKE VACUUM OF AUXILIARY PUMP IS NOT  
TO EXCEED 6 INCHES OF MERCURY FOR  
PETROLEUM OIL.

## SCHEMATIC HYDRAULIC CIRCUIT OF MAIN PUMP, AUXILIARY PUMP AND CONTROL



### HOW TO ORDER

#### PUMP

ALL PUMPS	ROTATION	DISPLACEMENT	DESIGN NO.
PVA120 OR PVA180	-R (RIGHT HAND) OR -L (LEFT HAND)	S (ONE SIDE OF CENTER) OR D (BOTH SIDES OF CENTER)	SUBJECT TO CHANGE. INSTALLATION DI- MENSIONS REMAIN THE SAME AS SHOWN FOR DESIGN NUMBERS 10 TO 19.
EXAMPLE: PVA120 - RS - 13			

#### CONTROL

ALL CONTROLS	USED ON	STROKE CONDITION	TYPE	SIZE	DESIGN NO.
CA	P (PUMP) OR M (MOTOR)	-D (BOTH SIDES CENTER) OR -S (ONE SIDE OF CENTER) PUMP YOKE DOWN	D (HYDRO- MECHANICAL)	2	-10
EXAMPLE: CAP - DD7 - 10					

SYSTEM FLANGES: INLET AND OUTLET FLANGES OF THE ELL-WELDING NECK TYPE, 3-1/2 INCH PIPE SIZE (NOMINAL), ARE AVAILABLE: MODEL NUMBER FL2-120-28BWL-10 (2 REQ'D) IS SHOWN ON 522810.

### EXAMPLE OF ORDER

1 PVA120 PUMP ASSEMBLY INCLUDING:

- 1 PVA 120-RD-13 PUMP
- 1 CAP-DD7-10 HYDRO-MECHANICAL CONTROL
- 1 V210-5-1A-12-S214-LH AUXILIARY PUMP
- 1 283265 AUX. PUMP MOUNTING KIT
- 2 FL2-120-28BWL-10 FLANGES



**\* CAUTION:**  
THE FLOW FROM THE PVA PUMP SHOULD BE RETURNED TO TANK AT START-  
UP UNTIL PRESSURE IS AVAILABLE AT THE CONTROL SYSTEM INLET.

CONTROL HYDRO-MECHANICAL CONTROL PROVIDES HYDRAULIC BOOSTER ACTION FOR INSTANT RESPONSE FROM A SMALL MECHANICAL INPUT. IT ACCURATELY CONTROLS YOKE POSITION (PUMP DISPLACEMENT) THROUGH FULL CONTROL RANGE.

CONTROL NOTE  
THE HYDRO-MECHANICAL CONTROL REQUIRES A CONTINUOUS SUPPLY TO THE PUMP DIS-  
PLACEMENT CONTROL. THIS CAN BE PROVIDED FOR BY THE AUXILIARY VANE PUMP. THE  
CONTROL PRESSURE RELIEF VALVE, AND CONNECTING TUBING ARE INCLUDED AS PART OF  
THE CONTROL AND ARE ASSEMBLED ON THE UNIT.

MAX. CONTROL FLOW THRU RELIEF VALVE ..... APPROX. 5 GPM  
THEORETICAL FLOW FROM EXTERNAL SOURCE REQUIRED BY HYDRO-MECHANICAL CONTROL  
CIRCUIT TO MAKE ONE COMPLETE STROKE (30°-30°) IN ONE SECOND IS 2.5 GPM.

CONTROL PRESSURE RANGE ..... 360 TO 1000 PSI  
FACTORY ADJUSTED TO ..... 750 PSI

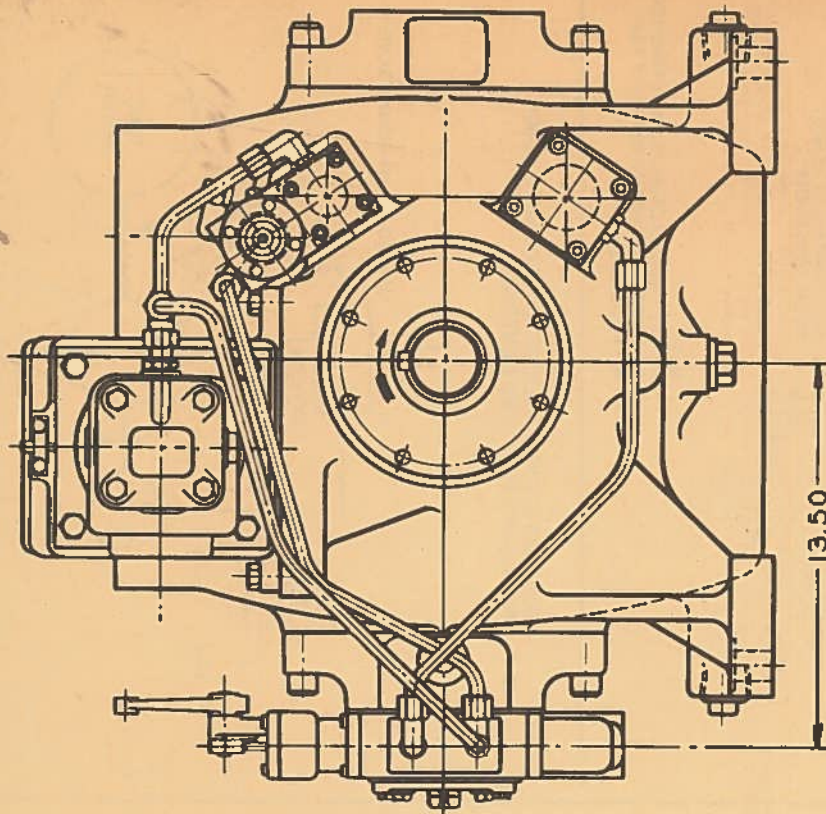
S-569 FEATURE (SINGLE SIDE OF CENTER ONLY)  
WHEN THE "S-569" PUMP IS MOUNTED HORIZONTALLY AS SHOWN, THE YOKE OPERATION IS  
IN THE UPPER QUADRANT. THIS "S-569" MUST BE INDICATED ON THE ORDER IN BOTH THE  
MODEL NUMBER FOR THE PUMP AND THE CONTROL. (EXAMPLE BELOW ON HOW TO ORDER.)  
UNDER ABOVE DUTY CONDITIONS, THE "S-569" FEATURE PERMITS THE PUMP YOKE TO  
SETTLE TO THE ZERO DISPLACEMENT POSITION (CENTER) WHEN PUMP AND CONTROL POWER  
ARE OFF. WITH THE PUMP YOKE IN THE CENTER POSITION AND CONTROL SET FOR NO FLOW,  
STARTING IS SIMPLIFIED. THE PUMP OUTLET NEED NOT BE BYPASSED TO TANK WHILE  
CONTROL POWER SYSTEM IS BEING STARTED.

EXAMPLE OF ORDER: CAP-SD7-10-S569  
1 PVA160 PUMP ASSY INCL:  
1 PVA160-LS-13-S569  
1 CAP-SD7-10-S569  
1 V3230-15-S-1C-12-S214  
1 293264 MOUNTING KIT  
2 FL2-120-288WL-10 FLANGES

## OPTIONAL HYDRO-MECHANICAL CONTROL LOCATION

HYDRO-MECHANICAL CONTROL CAN BE SUPPLIED WITH CON-  
TROL MOUNTED ON EITHER SIDE, TO OBTAIN PUMPS WITH THE  
CONTROL MOUNTED AS SHOWN ABOVE, ADD "LH" SUFFIX TO  
CONTROL MODEL NUMBER.

EXAMPLE OF ORDER:  
1 - PVA120 PUMP ASSY. INCL:  
1 - PVA120-RD-13 PUMP  
1 - CAP-SD7-10-LH  
1 - V3230-15-S-1C-12-S214-LH  
1 - 293264 MOUNTING KIT  
2 - FL2-120-288WL-10 FLANGES





**MODEL SERIES PVA 120 AND PVA150  
WITH PRESSURE COMPENSATOR CONTROL**

**VICKERS DIVISION  
OF SPERRY RAND CORPORATION  
TROY, MICHIGAN 48064**

### VARIABLE DISPLACEMENT

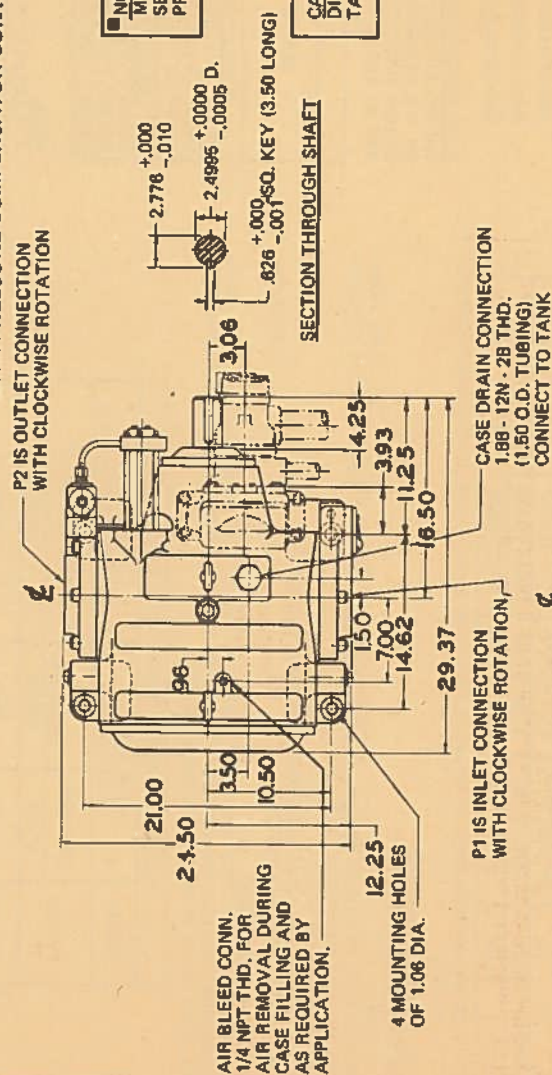
## PRESSURE COMPENSATOR CONTROL

**PVA120 - TO 180  
GPM AND 5000  
PSI OUTPUT**

**PVA150 - TO 150  
GPM AND 3000  
PSI OUTPUT**

### FOOT MOUNTING

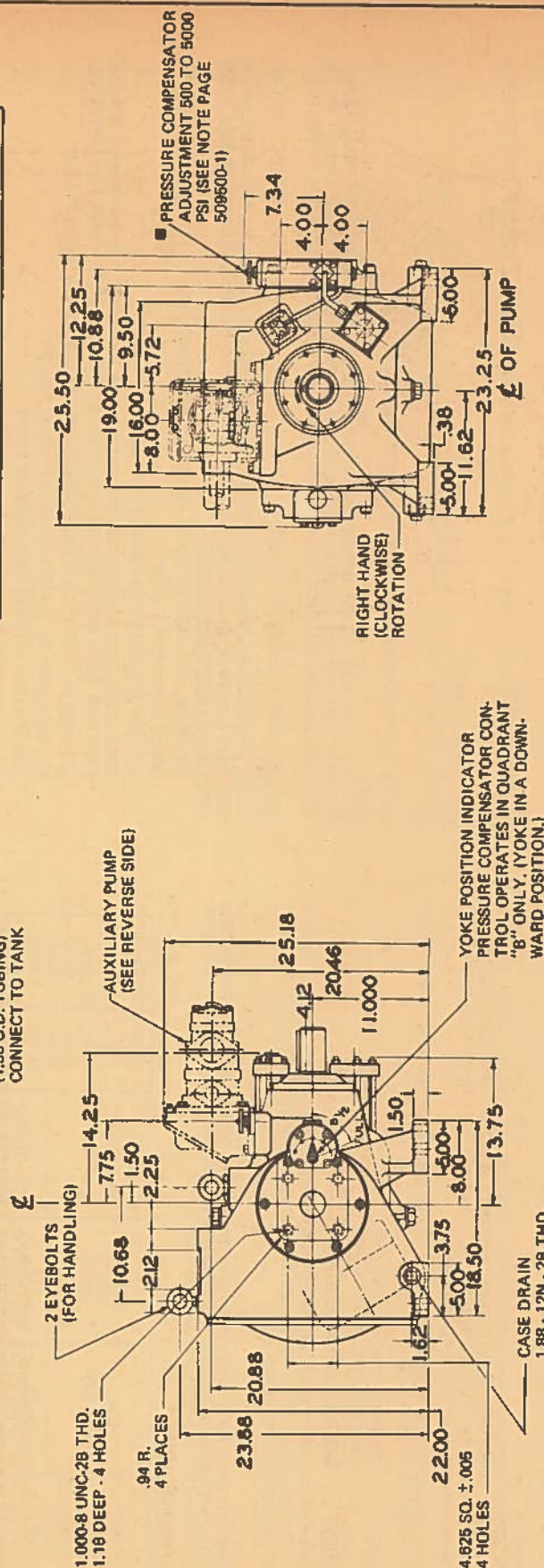
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**MAXIMUM PUMP DELIVERY RATE IS MAINTAINED UP TO CONTROL PRESSURE SETTING BEFORE BEING REDUCED. A RELIEF VALVE IS RECOMMENDED TO PROTECT AGAINST PRESSURE OVER-RIDE DURING PUMP YOKE TRAVEL.**

**CAUTION: AFTER SHUT-DOWN YOKE WILL MOVE TO FULL DOWN (MAXIMUM DISPLACEMENT) POSITION. UPON RE-START THIS POSITION WILL BE MAINTAINED UNTIL SYSTEM PRESSURE REACHES COMPENSATOR SETTING.**

SHAFT ROTATION	OUTLET PORT	INLET PORT
CLOCKWISE	P2	P1
COUNTERCLOCKWISE	P1	P2



**PRESSURE COMPENSATOR  
ADJUSTMENT 500 TO 5000  
PSI (SEE NOTE PAGE  
509500-1)**

**YOKE POSITION INDICATOR  
PRESSURE COMPENSATOR CON-  
TROL OPERATES IN QUADRANT  
"B" ONLY. (YOKE IN A DOWN-  
WARD POSITION.)**

**CASE DRAIN  
1.88 - 12N - 28 THD.  
MAGNETIC PLUGS  
(EACH SIDE)**

REVISÉ 1-3-72



**GENERAL DATA**  
PUMPS ARE OF ANGLE-TYPE, VARIABLE DISPLACEMENT, AXIAL PISTON DESIGN. THE PVA120 WILL PRODUCE FLOWS TO 180 GPM AT 1800 RPM AND HAS PRESSURE RATINGS TO 5000 PSI MAXIMUM. THE PVA150 OUTPUT IS 150 GPM AT 1200 RPM AND PRESSURES UP TO 3000 PSI. PRESSURE COMPENSATOR PROVIDES AUTOMATIC CONTROL OF PUMP DISPLACEMENT TO PROVIDE PRESELECTED SYSTEM PRESSURE. ONE WAY PUMPING ACTION IS PROVIDED.

**INSTALLATION**  
A FULL SIZE UNRESTRICTED DRAIN LINE (1.50 O.D. TUBE OR EQUIVALENT) MUST BE CONNECTED DIRECTLY FROM THE CASE DRAIN CONNECTION TO A LOCATION BELOW THE LOWEST FLUID LEVEL IN THE SYSTEM RESERVOIR. PRESSURE SURGES AT THE CASE DRAIN CONNECTION ON PUMP SHOULD NOT EXCEED 20 PSI.

CIRCUIT MUST PROVIDE FOR CIRCULATION OF COOL OIL THROUGH PUMP CASE FROM BOTTOM TO TOP DRAIN CONNECTION.

**PVA 120 SERIES:**  
1200 RPM - CIRCULATE 3 GPM  
1800 RPM - CIRCULATE 5 GPM

**PVA 150 SERIES:**  
1200 RPM - CIRCULATE 3 GPM

CASE PRESSURE OF 10 PSI ± 5 MUST BE MAINTAINED WHEN OPERATING AT SPEEDS ABOVE 1200 RPM. IF NECESSARY, 5 OR 10 PSI CHECK VALVE MAY BE USED IN THE CASE COOLING OIL CIRCUIT TO OBTAIN CASE PRESSURE.

**STARTING**  
BEFORE START-UP FILL PUMP CASE WITH SYSTEM FLUID THROUGH CASE DRAIN CONNECTION. (USE AIRBLEED PROVIDED) CASE MUST REMAIN FULL OF FLUID TO PROVIDE INTERNAL LUBRICATION. (AVOID SIPHONING ACTION.)

**OPERATING SPECIFICATIONS**

MODEL NO.	THEO. RETICAL MAX. DISP. CU. IN./REV.	GPM DELIVERY		DRIVE SPEED RPM		PRESSURE PSI		VOL. EFF. AT MAX. DISP., MAX. PSI & RATED RPM		OVERALL EFF. AT MAX. DISP., MAX. PSI & RATED RPM
		RATED	MAX.	RATED	MAX.	RATED	MAX.	RATED	MAX.	
PVA120	23.71	120	180	1200	1800	3000	5000	96%		94%
PVA150	28.96	150	150	1200	1200	2500	3000			

NOTE: VICKERS ENGINEERING APPROVAL IS REQUIRED FOR ALL APPLICATIONS WITH SPEEDS ABOVE 1200 RPM.

**FILTRATION RECOMMENDED WITH ATMOSPHERIC INLET**  
IN ADDITION, 25 MICRON PARTIAL FLOW FILTRATION (20% MINIMUM) OF THE OIL RETURN INLET LINE.

ING TO TANK SHOULD BE USED.  
25 MICRON FILTER TO BE USED ON THE PISTON PUMP INLET.  
CIRCULATING CASE-COOLING OIL. .... 25 MICRONS

**PUMP INLET CONDITIONS**  
FOR APPLICATIONS OVER 1200 RPM, FOR SYNTHETIC FIRE RESISTANT FLUIDS, (WITH ENGINEERING REVIEW AND COMMENTS), 100 PSI SUPERCHARGE PRESSURE IS PREFERRED. NOTE THAT INLET PRESSURE REDUCES SOUND.

ABSOLUTE MINIMUM PRESSURE AT PUMP INLET			
MODEL	ONE SIDE OF CENTER	TO	*SYNTHETIC FIRE RESISTANT FLUIDS
PVA120	1200 RPM	1800 RPM	1200 RPM ONLY
	4" HG	50 PSI	100 PSI
PVA150	4" HG	NOT APPROVED	100 PSI

\*COMMONLY USED INDUSTRIAL SYNTHETIC FIRE RESISTANT FLUIDS ONLY. NO WATER GLYCOL, WATER-IN-OIL EMULSION OR SOLUBLE OIL-IN-WATER SOLUTIONS.  
MINIMUM OUTLET PRESSURE  
A MINIMUM PRESSURE OF 150 PSI AT THE PUMP OUTLET IS RECOMMENDED.

NOTE: IF SYSTEM PRESSURE IS IMPOSED ON THE PUMP INLET AND OUTLET PORTS AT THE SAME TIME, EVEN FOR A SHORT DURATION, PUMP SHOULD PROBABLY HAVE A MOTOR VALVE PLATE. CONTACT VICKERS APPLICATION ENGINEER FOR ASSISTANCE.

COMPENSATOR ADJUSTMENT RANGE (CUSTOMER MUST LIMIT ADJUSTMENT AS SHOWN)  
PVA120..... 500 TO 5000 PSI  
PVA150..... 500 TO 3000 PSI

**DRIVE ROTATION**  
EITHER CLOCKWISE OR COUNTERCLOCKWISE ROTATION IS AVAILABLE. INDICATE ROTATION WHEN ORDERING.

INPUT HORSEPOWER  
APPROX. INPUT HP REQ'D =  $\frac{\text{FLOW} \times \text{PRESSURE}}{1714} \times \frac{1}{\text{OVERALL EFFICIENCY}} + \text{AUX. PUMP INPUT HP}$   
(ACTUAL HP INPUT REQUIRED DEPENDS ON DUTY CYCLE)

**FLUID**  
CLEAN PETROLEUM OIL OF VISCOSITY RANGE 225 TO 325 SSU AT 100° F. MEETING OR EXCEEDING LUBRICATING QUALITIES OF SAE OIL OF API SERVICE CLASSIFICATION MS IS RECOMMENDED. REFER TO DATA SHEET I-286-S (SECTION L) FOR ADDITIONAL INFORMATION.

**WEIGHT (PUMP AND CONTROL-DRY)..... APPROX. 1100 LBS.**

THESE UNITS ARE DESIGNED TO MEET SPECIFICATIONS AS OUTLINED. TO INSURE MAXIMUM UNIT PERFORMANCE, IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION, CONSULT YOUR APPLICATION ENGINEER IF YOUR:

PRESSURE REQUIREMENTS ARE ABOVE RATED PRESSURES.

SPEED IS ABOVE RATED RPM.

SYSTEM REQUIRES FIRE-RESISTANT FLUID.

OPERATING TEMPERATURE IS NOT WITHIN 100° F. TO 150° F. WITH PROPER APPLICATION AND FLUID CONSIDERATION, A GREATER TEMPERATURE RANGE IS PERMISSIBLE.

OIL VISCOSITY AT OPERATING TEMPERATURE IS NOT WITHIN 100 TO 250 SSU.

OIL VISCOSITY AT START-UP IS IN EXCESS OF 1000 SSU.

APPLICATION REQUIRES AN INDIRECT DRIVE.

NEEDS REQUIRE APPLICATION ASSISTANCE.

MOUNTING IS OTHER THAN HORIZONTAL.

#### AUXILIARY PUMPS

THE PVA SERIES PUMPS PROVIDE FOR AN OPTIONAL AUXILIARY PUMP. THESE ARE MOUNTED ON THE HOUSING AND DRIVEN BY AN INTERNAL 1-1 DRIVE FROM THE MAIN PUMP SHAFT. EITHER SINGLE OR DOUBLE VANE PUMPS MAY BE SPECIFIED. PUMPS AND MOUNTING KITS ARE AS TABULATED.

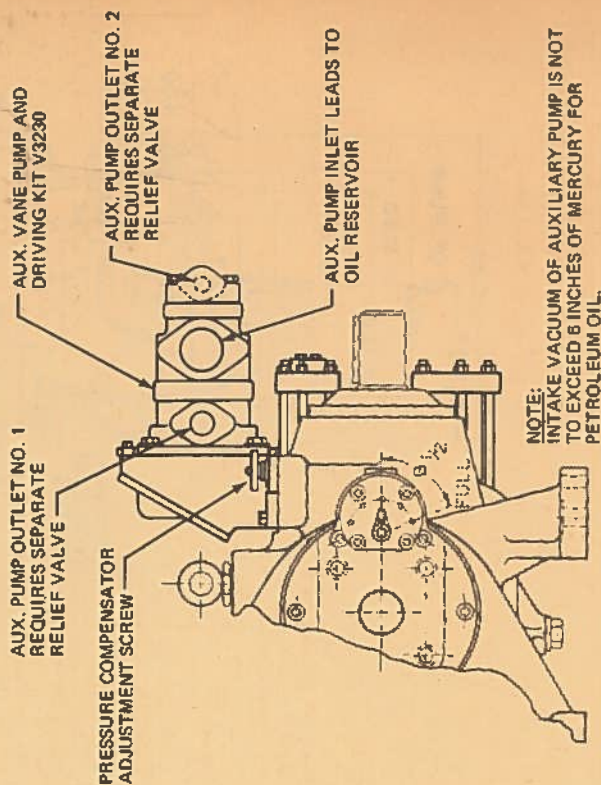
MODEL	GPM APPROX. AT 1200 RPM		MOUNTING KIT	INST. DRWG.
	SHAFT END	HEAD END		
SINGLE PUMPS V210 - 1A-12-S214-LH V330 - 1A-11-S214-LH V430 - 1A-11-S214-LH	2-5-6-8W-9W-11W 15-19-24 28-36		293265 293266 293264	I-238693 I-238694 I-238695
	2-5-6-8W-9W-11W 15-19-24 28-36		293266 293264	I-248700 I-248701 I-248702
	2-5-6-8W-9W-11W 15-19-24 28-36		293266 293264	I-248700 I-248701 I-248702
	2-5-6-8W-9W-11W 15-19-24 28-36		293266 293264	I-248700 I-248701 I-248702

#### NOTE:

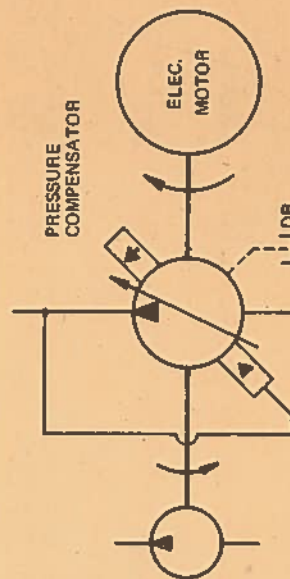
- AUXILIARY PUMP'S ROTATION IS OPPOSITE THAT OF MAIN PUMP - ADD "LH" SUFFIX TO AUXILIARY PUMP ONLY FOR PVA \*\*\*B MODELS.
- HORSEPOWER INPUT TO THE AUXILIARY PUMP IS LIMITED TO 10 HP AT 1200 RPM AND 15 HP AT 1800 RPM.
- INLET CONNECTION AND INTAKE STRAINER SHOULD BE PROVIDED FOR THE AUXILIARY PUMP DRAWING 500800 (ON T10 POWER UNITS AND DRAWING 522150 (ON INTAKE FILTERS) WILL PROVIDE GENERAL INFORMATION.



# AUXILIARY PUMP (DOUBLE PUMP SHOWN)



SCHEMATIC HYDRAULIC CIRCUIT OF MAIN PUMP, AUXILIARY PUMP AND CONTROL



## HOW TO ORDER

### PUMP

ALL PUMPS	ROTATION	DISPLACEMENT	DESIGN NO.
PVA120 OR PVA150	-R (RIGHT HAND) OR -L (LEFT HAND)	S (ONE SIDE OF CENTER)	SUBJECT TO CHANGE. INSTALLATION DI- MENSIONS REMAIN THE SAME AS SHOWN FOR DESIGN NUMBERS. 10 TO 19.
EXAMPLE: PVA120 - RS - 13			

### CONTROL

ALL CONTROLS	USED ON	STROKE CONDITION	TYPE	SIZE	DESIGN NO.
CA	P (PUMP) M (MOTOR)	-S (ONE SIDE OF CENTER)	CR (COMPENSATOR RIGHT HAND)	Z	-20
EXAMPLE: CAP - SCR7 - 20					

SYSTEM FLANGES: INLET AND OUTLET FLANGES OF THE ELL-WELDING NECK TYPE, 3-1/2 INCH PIPE SIZE (NOMINAL), ARE AVAILABLE: MODEL NUMBER FL2-120-288WL-10 (2 REQ'D) IS SHOWN ON 522810.

## EXAMPLE OF ORDER

(WITH AUXILIARY PUMP)

1 PVA120 PUMP  
ASSEMBLY INCLUDING:  
1 PVA120-RS-13 PUMP  
1 CAP-SCR7-20 PRESSURE  
COMPENSATOR CONTROL  
1 V210-5-1C-12-S214-LH AUX. PUMP  
1 293265 AUX. PUMP MOUNTING KIT  
2 FL2-120-288WL-10 FLANGE

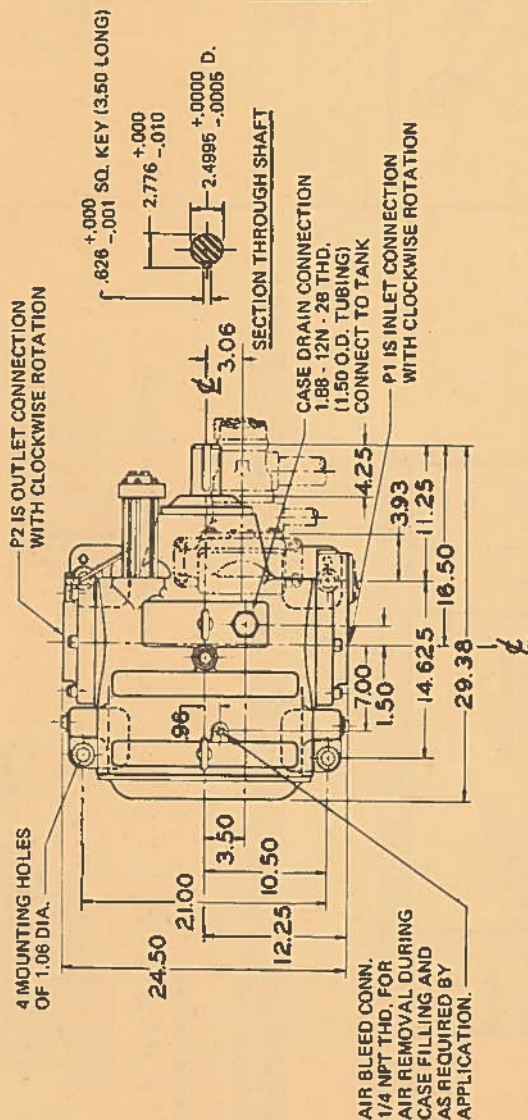
(WITHOUT AUXILIARY PUMP)

1 PVA120 PUMP  
ASSEMBLY INCLUDING:  
1 PVA120-RS-13 PUMP  
1 CAP-SCR7-20 PRESSURE  
COMPENSATOR CONTROL  
2 FL2-120-288WL-10 FLANGE

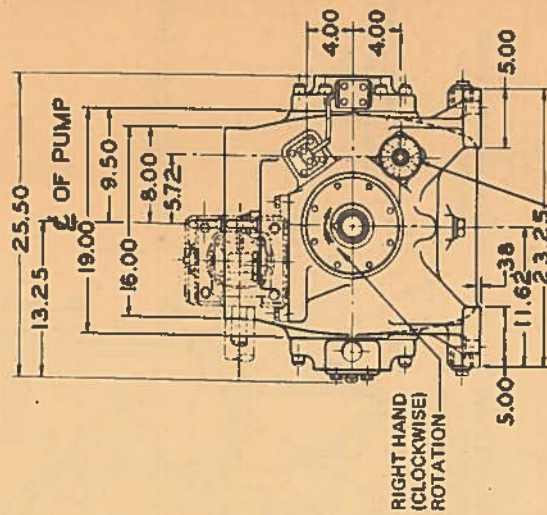


# VICKERS® VARIABLE DISPLACEMENT PISTON PUMPS

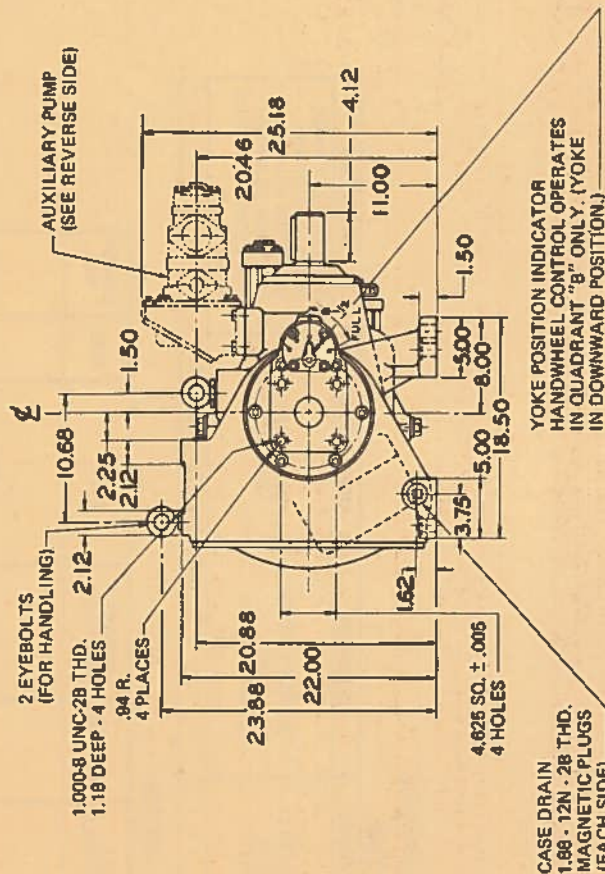
MODEL SERIES PVA120 AND PVA150  
WITH HANDWHEEL CONTROL



SHAFT ROTATION	OUTLET PORT	INLET PORT
CLOCKWISE	P2	P1
COUNTERCLOCKWISE	P1	P2



TO VARY PUMP DELIVERY, LOOSEN HEX NUT AND INSERT .50 DIA. BAR IN HANDWHEEL HOLE. ROTATE CLOCKWISE TO INCREASE DELIVERY AND COUNTERCLOCKWISE TO DECREASE. TIGHTEN HEX NUT TO LOCK POSITION.



REVISED 1-3-72

509600

VICKERS DIVISION  
OF SPERRY RAND CORPORATION  
TROY, MICHIGAN 48064

PUMP  
PISTON TYPE

VARIABLE  
DISPLACEMENT

HANDWHEEL  
CONTROL

PVA120 - TO 180  
GPM AND 5000  
PSI OUTPUT

PVA150 - TO 180  
GPM AND 3000  
PSI OUTPUT

FOOT  
MOUNTING

DWG. NO.  
509600



## GENERAL DATA

PUMPS ARE OF ANGLE-TYPE, VARIABLE DISPLACEMENT, AXIAL PISTON DESIGN. THE PVA120 WILL PRODUCE FLOWS TO 180 GPM AT 1800 RPM AND HAS PRESSURE RATINGS TO 5000 PSI MAXIMUM. THE PVA150 OUTPUT IS 150 GPM AT 1200 RPM AND PRESSURES UP TO 3000 PSI. HANDWHEEL: A MANUAL, MECHANICAL CONTROLLER OF THE PUMP DISPLACEMENT. ONE WAY PUMPING ACTION IS PROVIDED.

## INSTALLATION

A FULL SIZE UNRESTRICTED DRAIN LINE (1.50 O.D. TUBE OR EQUIVALENT) MUST BE CONNECTED DIRECTLY FROM THE CASE DRAIN CONNECTION TO A LOCATION BELOW THE LOWEST FLUID LEVEL IN THE SYSTEM RESERVOIR. PRESSURE SURGES AT THE CASE DRAIN CONNECTION ON PUMP SHOULD NOT EXCEED 20 PSI.

CIRCUIT MUST PROVIDE FOR CIRCULATION OF COOL OIL THROUGH PUMP CASE FROM BOTTOM TO TOP DRAIN CONNECTION.

**PVA 120 SERIES:**  
1200 RPM - CIRCULATE 3 GPM  
1800 RPM - CIRCULATE 5 GPM

**PVA 150 SERIES:**  
1200 RPM - CIRCULATE 3 GPM

CASE PRESSURE OF 10 PSI ± 5 MUST BE MAINTAINED WHEN OPERATING AT SPEEDS ABOVE 1200 RPM. IF NECESSARY, 5 OR 10 PSI CHECK VALVE MAY BE USED IN THE CASE-COOLING OIL CIRCUIT TO OBTAIN CASE PRESSURE.

## STARTING

BEFORE START-UP, FILL PUMP CASE WITH SYSTEM FLUID THROUGH CASE DRAIN CONNECTION. (USE AIRBLEED PROVIDED) CASE MUST REMAIN FULL OF FLUID TO PROVIDE INTERNAL LUBRICATION. (AVOID SIPHONING ACTION.)

## OPERATING SPECIFICATIONS

MODEL NO.	THEO. RETICAL MAX. DISP. CU. IN./REV.	GPM DELIVERY		DRIVE SPEED RPM		PRESSURE PSI		VOL. EFF. AT MAX. DISP. PSI & RPM		OVERALL EFF. AT MAX. DISP. PSI & RPM
		RATED	MAX.	RATED	MAX.	RATED	MAX.	RATED	MAX.	
PVA120	23.71	120	180	1200	1800	3000	5000	96%		94%
PVA150	28.96	150	150	1200	1200	2500	3000			

NOTE: VICKERS ENGINEERING APPROVAL IS REQUIRED FOR ALL APPLICATIONS WITH SPEEDS ABOVE 1200 RPM.

## FILTRATION RECOMMENDED

WITH ATMOSPHERIC INLET

INLET LINE: 25 MICRON PARTIAL FLOW FILTRATION (20% MINIMUM) OF THE OIL RETURN. IN ADDITION, 25 MICRON PARTIAL FLOW FILTRATION (20% MINIMUM) OF THE OIL RETURN. IN ADDITION, 25 MICRON PARTIAL FLOW FILTRATION (20% MINIMUM) OF THE OIL RETURN. IN ADDITION, 25 MICRON PARTIAL FLOW FILTRATION (20% MINIMUM) OF THE OIL RETURN.

WITH SUPERCHARGE INLET

25 MICRON FILTER TO BE USED ON THE PISTON PUMP INLET.

CIRCULATING CASE-COOLING OIL: 25 MICRONS

## PUMP INLET CONDITIONS

FOR APPLICATIONS OVER 1200 RPM, FOR SYNTHETIC FIRE RESISTANT FLUIDS, (WITH ENGINEERING REVIEW AND COMMENTS), 100 PSI SUPERCHARGE PRESSURE IS PREFERRED. NOTE THAT INLET PRESSURE REDUCES SOUND.

MODEL	ABSOLUTE MINIMUM PRESSURE AT PUMP INLET		
	ONE SIDE OF CENTER	TO	*SYNTHETIC FIRE RESISTANT FLUIDS
PVA120	1200 RPM	1800 RPM	1200 RPM ONLY
	4" HG	50 PSI	100 PSI
PVA150	4" HG	NOT APPROVED	100 PSI

\*COMMONLY USED INDUSTRIAL SYNTHETIC FIRE RESISTANT FLUIDS ONLY. NO WATER GLYCOL, WATER-IN-OIL EMULSION OR SOLUBLE OIL-IN-WATER SOLUTIONS.

## MINIMUM OUTLET PRESSURE

A MINIMUM PRESSURE OF 150 PSI AT THE PUMP OUTLET IS RECOMMENDED.

NOTE: IF SYSTEM PRESSURE IS IMPOSED ON THE PUMP INLET AND OUTLET PORTS AT THE SAME TIME, EVEN FOR A SHORT DURATION, PUMP SHOULD PROBABLY HAVE A MOTOR VALVE PLATE. CONTACT VICKERS APPLICATION ENGINEER FOR ASSISTANCE.

## DRIVE ROTATION

EITHER CLOCKWISE OR COUNTERCLOCKWISE ROTATION IS AVAILABLE. INDICATE ROTATION WHEN ORDERING.

## INPUT HORSEPOWER

$$\text{APPROX. INPUT HP REQ'D} = \frac{\text{FLOW} \times \text{PRESSURE}}{1714} \times \frac{1}{\text{OVERALL EFFICIENCY}} + \text{AUX. PUMP INPUT HP}$$

(ACTUAL HP INPUT REQUIRED DEPENDS ON DUTY CYCLE)

## FLUID

CLEAN PETROLEUM OIL OF VISCOSITY RANGE 225 TO 325 SSU AT 100° F. MEETING OR EXCEEDING LUBRICATING QUALITIES OF SAE OIL OF API SERVICE CLASSIFICATION MS IS RECOMMENDED. REFER TO DATA SHEET I-286S (SECTION L) FOR ADDITIONAL INFORMATION.

WEIGHT (PUMP AND CONTROL-DRY)..... APPROX. 1100 LBS.

THESE UNITS ARE DESIGNED TO MEET SPECIFICATIONS AS OUTLINED. TO INSURE MAXIMUM UNIT PERFORMANCE, IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION, CONSULT YOUR APPLICATION ENGINEER IF YOUR:

PRESSURE REQUIREMENTS ARE ABOVE RATED PRESSURES.

SPEED IS ABOVE RATED RPM.

SYSTEM REQUIRES FIRE-RESISTANT FLUID.

OPERATING TEMPERATURE IS NOT WITHIN 100° F. TO 150° F. WITH PROPER APPLICATION AND FLUID CONSIDERATION, A GREATER TEMPERATURE RANGE IS PERMISSIBLE.

OIL VISCOSITY AT OPERATING TEMPERATURE IS NOT WITHIN 100 TO 250 SSU.

OIL VISCOSITY AT START-UP IS IN EXCESS OF 1000 SSU.

APPLICATION REQUIRES AN INDIRECT DRIVE.

NEEDS REQUIRE APPLICATION ASSISTANCE.

MOUNTING IS OTHER THAN HORIZONTAL.

## AUXILIARY PUMPS

THE PVA SERIES PUMPS PROVIDE FOR AN OPTIONAL AUXILIARY PUMP. THESE ARE MOUNTED ON THE HOUSING AND DRIVEN BY AN INTERNAL 1:1 DRIVE FROM THE MAIN PUMP SHAFT. EITHER SINGLE OR DOUBLE VANE PUMPS MAY BE SPECIFIED. PUMPS AND MOUNTING KITS ARE AS TABULATED.

AUXILIARY PUMPS AVAILABLE †					
MODEL	GPM APPROX. AT 1200 RPM		MOUNTING KIT	INST. DRWG.	
	SHAFT END	HEAD END			
SINGLE PUMPS					
V210 - 1A-12-S214-LH	2-5-6-8W-9W-11W 15-19-24 28-36		283265	1-236693	
V330 - 1A-11-S214-LH			293286	1-236894	
V430 - 1A-11-S214-LH			293264	1-236695	
DOUBLE PUMPS					
V2230 - 1A-20-S214-LH	2-5-6-8W-9W-11W 15-19-24 28-36		283266	1-248700	
V3230 - 1A-10-S214-LH			293284	1-248701	
V4240 - 1A-10-S214-LH			293264	1-248702	

## NOTE:

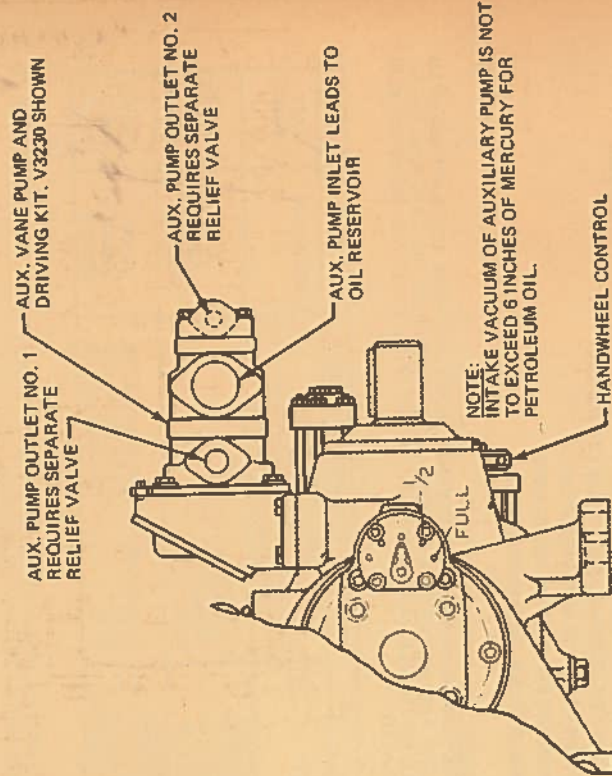
1. AUXILIARY PUMP'S ROTATION IS OPPOSITE THAT OF MAIN PUMP - ADD "LH" SUFFIX TO AUXILIARY PUMP ONLY FOR PVA\*\*B MODELS.

†2. HORSEPOWER INPUT TO THE AUXILIARY PUMP IS LIMITED TO 10 HP AT 1200 RPM AND 15 HP AT 1800 RPM.

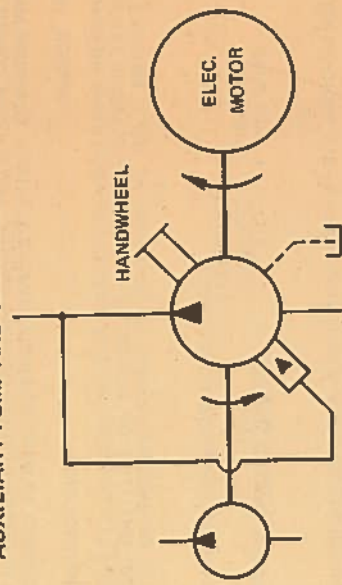
3. INLET CONNECTION AND INTAKE STRAINER SHOULD BE PROVIDED FOR THE AUXILIARY PUMP. DRAWING 500800 (ON T10 POWER UNITS AND DRAWING 522150 (ON INTAKE FILTERS) WILL PROVIDE GENERAL INFORMATION.



# AUXILIARY PUMP (DOUBLE PUMP SHOWN)



SCHEMATIC HYDRAULIC CIRCUIT OF MAIN PUMP, AUXILIARY PUMP AND CONTROL



## HOW TO ORDER

PUMP			EXAMPLE: PVA120 - RS - 13	
ALL PUMPS	ROTATION	DISPLACEMENT	DESIGN NO.	SUBJECT TO CHANGE. INSTALLATION DIMENSIONS REMAIN THE SAME AS SHOWN FOR DESIGN NUMBERS 10 TO 18.
PVA120 OR PVA150	-R (RIGHT HAND) OR -L (LEFT HAND)	5 (ONE SIDE OF CENTER)		

## CONTROL

ALL CONTROLS	USED ON	STROKE CONDITION	TYPE	SIZE	DESIGN NO.
CA	P (PUMP) M (MOTOR)	-S (ONE SIDE OF CENTER)	HR (HANDWHEEL RIGHT HAND)	2	-10
EXAMPLE: CAP - SHR7 - 10					

SYSTEM FLANGES: INLET AND OUTLET FLANGES OF THE ELL-WELDING NECK TYPE, 3-1/2 INCH PIPE SIZE (NOMINAL), ARE AVAILABLE. MODEL NUMBER FL2-120-288WL-10 (2 REQ'D) IS SHOWN ON 522910.

## EXAMPLE OF ORDER

(WITH AUXILIARY PUMP)

- 1 PVA120 PUMP
- ASSEMBLY INCLUDING:
  - 1 PVA120-RS-13 PUMP
  - 1 CAP-SHR7-10 HANDWHEEL CONTROL
  - 1 V210-5-1C-12-S214-LH AUX. PUMP
  - 1 293266 AUX. PUMP MOUNTING KIT
  - 2 FL2-120-288WL-10 FLANGE

(WITHOUT AUXILIARY PUMP)

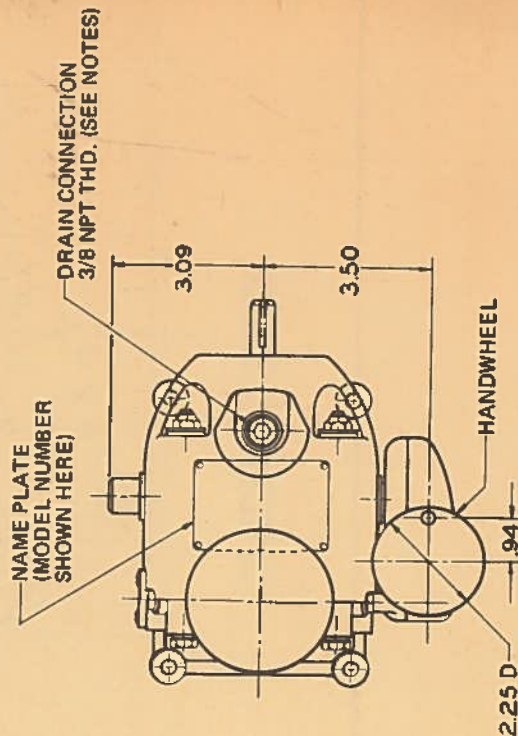
- 1 PVA120 PUMP
- ASSEMBLY INCLUDING:
  - 1 PVA120-RS-13 PUMP
  - 1 CAP-SHR7-10 HANDWHEEL CONTROL
  - 2 FL2-120-288WL-10 FLANGE



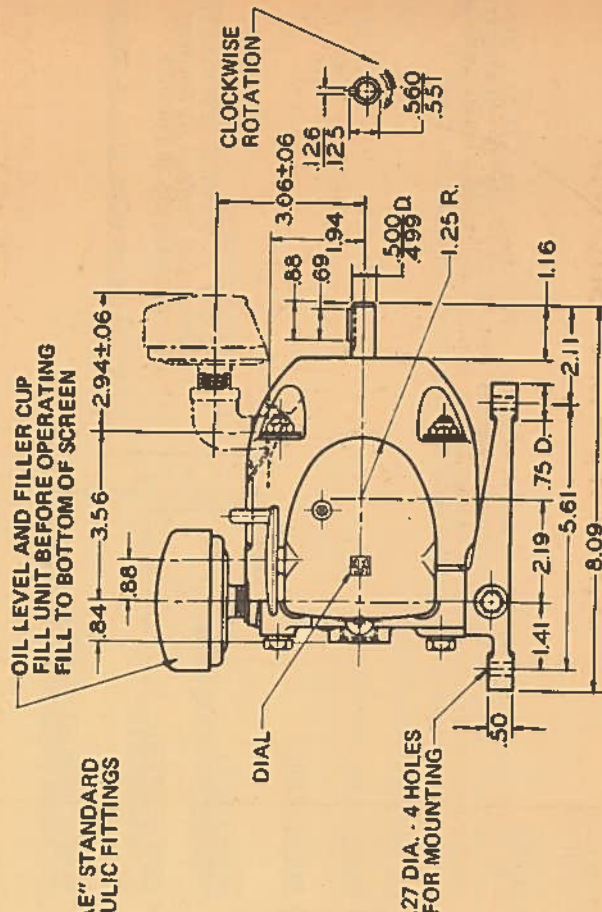
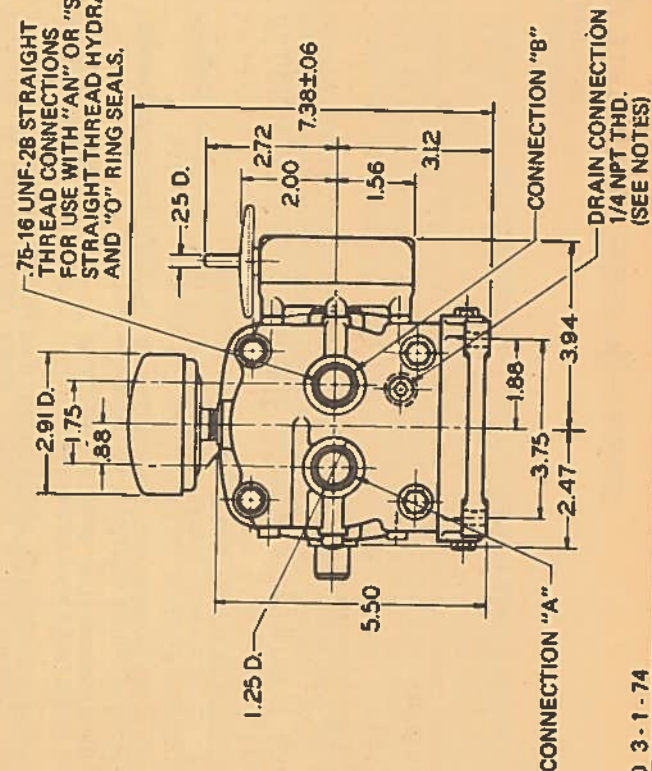


# VARIABLE DISPLACEMENT PISTON PUMPS

SERIES PTR3-HR13-20  
HANDWHEEL CONTROL



76-16 UNF-28 STRAIGHT  
THREAD CONNECTIONS  
FOR USE WITH "AN" OR "SAE" STANDARD  
STRAIGHT THREAD HYDRAULIC FITTINGS  
AND "O" RING SEALS.



REVISED 3-1-74

508200

SPERRY-VICKERS  
TROY, MICHIGAN 48084

PUMPS  
VARIABLE DELIVERY  
PISTON TYPE

HANDWHEEL  
CONTROL

5 GPM  
MAXIMUM

FOOT  
MOUNTING

DWG. NO.  
508200



**GENERAL DATA**

THIS PUMP IS A VARIABLE DISPLACEMENT PISTON TYPE PUMP FOR USE IN A CLOSED LOOP HYDRAULIC SYSTEM WITH A MTR3 HYDRAULIC MOTOR. IT HAS A BUILT-IN SUPERCHARGE PUMP AND SYSTEM RELIEF VALVE. RIGHT OR LEFT HAND ROTATION OF THE DRIVE SHAFT IS PERMISSIBLE. MOTOR DRAIN LINE MUST RISE ABOVE THE HIGHEST POINT OF THE MOTOR BEFORE RETURNING TO THE PTR3 PUMP. THIS DRAIN LINE MUST NOT BE RESTRICTED. CONTACT APPLICATION ENGINEER IF THE MOTOR DRAIN LINE IS ABOVE THE PTR3. THE PTR3 FILLER CAP DOES NOT SEAL.

**MODEL PTR3-HR13-20 (HANDWHEEL CONTROL)**  
DELIVERY OF PUMP AND DIRECTION OF OIL FLOW (INDEPENDENT OF DIRECTION OF ROTATION OF DRIVE SHAFT), ARE ADJUSTABLE BY HANDWHEEL CONTROL. THE HANDWHEEL DIAL IS CALIBRATED (0, 25, 50, 75 & 100) TO INDICATE PERCENT OF MAXIMUM DELIVERY OF PUMP.

**CLOCKWISE ROTATION OF DRIVE SHAFT (FACING SHAFT END)**

CONNECTION "B" IS DISCHARGE AND CONNECTION "A" IS INLET WHEN HANDWHEEL IS ROTATED COUNTERCLOCKWISE FROM NEUTRAL, "O" POSITION ON DIAL.  
CONNECTION "A" IS DISCHARGE AND CONNECTION "B" IS INLET WHEN HANDWHEEL IS ROTATED CLOCKWISE FROM NEUTRAL, "O" POSITION ON DIAL.  
TORQUE TO TURN HANDWHEEL IN EITHER DIRECTION. .... APPROX. 5 OZ. IN.  
TURNS TO SHIFT HARD-OVER TO HARD-OVER ..... APPROX. 24  
COUNTERCLOCKWISE ROTATION OF DRIVE SHAFT, (FACING SHAFT END)  
THE DISCHARGE CONNECTION IS REVERSED WHEN DRIVE SHAFT IS ROTATED COUNTERCLOCKWISE.

**INSTALLATION**

MOUNTING POSITION IS RESTRICTED ONLY BY THE LOCATION OF THE FILLER CUP WHICH MUST BE IN THE UPPERMOST POSITION TO PERMIT COMPLETE FILLING OF THE UNIT.

**CLOSED LOOP CIRCUIT**

WHEN USED IN A CLOSED LOOP WITH THE MTR3 MOTOR, CONNECT THE PTR3 CASE DRAIN TO THE MTR3 CASE DRAIN. SUPERCHARGE PRESSURE IS PROVIDED BY THE SUPERCHARGING PUMP IN THE PTR3.

**OPEN CIRCUIT**

THIS PUMP MAY BE USED IN AN OPEN CIRCUIT, IF FLUID IS SUPPLIED TO THE INLET AT 30 PSI PRESSURE.

**CASE DRAIN**

THE CASE DRAIN LINE MUST BE FULL SIZE UNRESTRICTED AND CONNECTED FROM THE UPPERMOST DRAIN PORT DIRECTLY TO THE RESERVOIR IN SUCH A MANNER THAT THE HOUSING REMAINS FILLED WITH FLUID. PIPING OF DRAIN LINE MUST PREVENT SIPHONING. PIPE DRAIN LINE SO THAT IT TERMINATES BELOW RESERVOIR FLUID LEVEL. NO OTHER LINES ARE TO BE CONNECTED TO THIS DRAIN LINE. CAUTION MUST BE EXERCISED TO NEVER EXCEED 5 PSI UNIT CASE PRESSURE.

OPERATING PRESSURE (MAXIMUM) ..... 500 PSI  
(UNIT PROTECTED BY A PROPERLY SET INTERNAL RELIEF VALVE)

**PERFORMANCE CHARACTERISTICS**

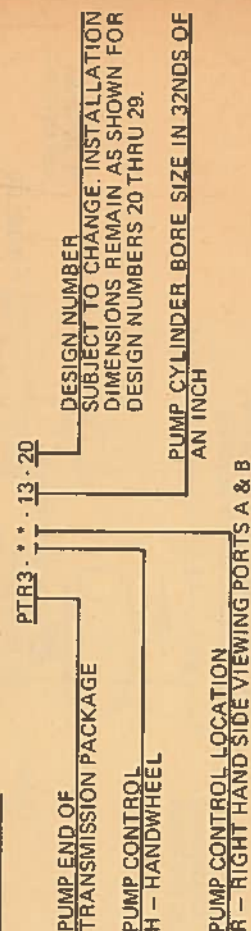
MAX. DISPLACEMENT CU. IN./REV.	NOMINAL DRIVE SPEED RPM	PRESSURE PSI	DELIVERY GPM	INPUT HP
.645	1800	250	4.8	.8
		500	4.7	1.6
	1200	250	3.2	.5
		500	3.1	1.1

**FLUIDS**  
USE CLEAN PETROLEUM ANTIWEAR INDUSTRIAL HYDRAULIC OIL, OR SAE 20-20W AUTOMOTIVE CRANKCASE OIL DESIGNATED SC, SD OR SE. TYPE "A" AUTOMATIC TRANSMISSION FLUID IS ALSO PERMISSIBLE. DRAIN AND REFILL WITH NEW OIL EVERY 2000 HOURS OF OPERATION OR 6 MONTHS, WHICHEVER OCCURS FIRST.

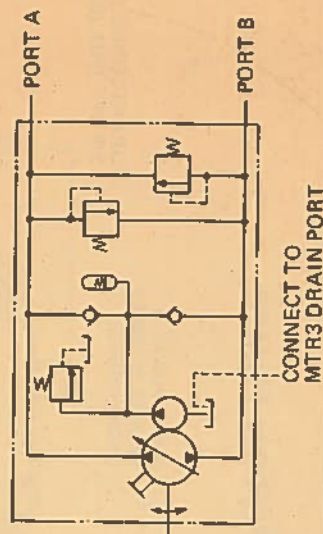
**OIL CAPACITY (QUARTS)** ..... 0.45

**WEIGHT LBS. (APPROX.)** ..... 13-1/2

**MODEL CODE**



**STANDARD GRAPHICAL SYMBOLS FOR FLUID POWER DIAGRAMS**



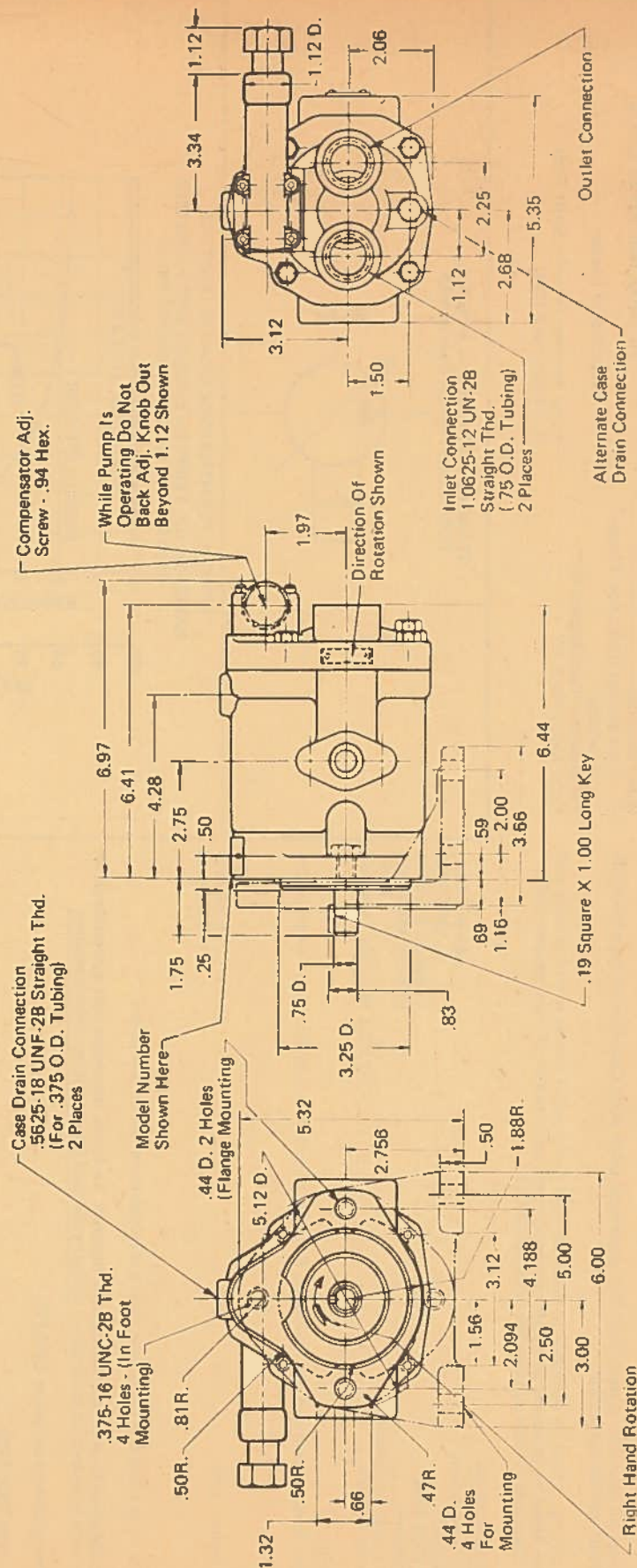


**SPERRY-VICKERS**

# **VARIABLE DISPLACEMENT PISTON PUMP**

PVB6A-20 DESIGN (IN-LINE TYPE)  
WITH PRESSURE COMPENSATOR CONTROL

**MODEL: PVB6A-FRS-20-CA-11**



## **Pressure Compensator Control**

The pressure compensator control automatically adjusts pump delivery to maintain volume requirements of the system at a pre-selected operating pressure. Maximum pump delivery, is maintained to approximately 50 PSI below the pressure control setting before being reduced. The pressure compensator control operates one side of center.

This pump may be operated in the pressure range of 250 to 1000 PSI.

**SPERRY-VICKERS**  
TROY, MICHIGAN 48084

**PISTON PUMP  
IN-LINE TYPE**

**PVB6A VARIABLE  
DISPLACEMENT**

**6.5 GPM  
1000 PSI  
OUTLET**

**PRESSURE  
COMPENSATOR  
CONTROL**

**FLANGE OR  
FOOT  
MOUNTING**

**DWG. NO.  
508275A**

REVISED 12-1-78

508275A

SEC  
C



### General Data

This unit is of the axial piston, variable displacement, in-line design, displacement is varied by means of a pressure compensator control.

### Installation Information

Horizontal mounting is recommended to maintain necessary case fluid level. The case drain line must be full size unrestricted and connected from the uppermost drain port directly to the reservoir in such a manner that the case remains filled with fluid. Piping on drain line must prevent siphoning. Pipe drain line so that it terminates below reservoir fluid level. No other lines are to be connected to this drain line. Caution must be exercised to never exceed 5 PSI unit case pressure.

### Starting

Before starting, fill case with system fluid thru uppermost drain port. Case must be kept full at all times to provide internal lubrication.

When first starting, it may be necessary to bleed air from pump outlet line to permit priming and reduce noise. Bled by loosening an outlet connection until solid stream of fluid appears. An air-bleed valve is available for this purpose. See drawing 521601.

### Operating Specifications

Theoretical Displacement	843 In. <sup>3</sup> /Rev.
Operating Speed	1800 RPM
Delivery @ 1800 RPM	Approx. 6.5 GPM
Operating Pressure	1000 PSI Maximum
Case Pressure (Not To Exceed)	5 PSI
Minimum Inlet Pressure	12 PSIA (5 In. Hg. Vacuum)

### Drive Rotation

Shaft rotation is right hand and not reversible. Rotation direction is indicated by an arrow on the pump.

### Filtration

Pressure or Return Line	25 Microns
Inlet	149 Microns

### Fluids

Refer to data sheet I-286-S for hydraulic fluid and temperature recommendations.

This unit is designed to meet specifications as outlined. To insure maximum unit performance, in conjunction with your specific application, consult your local Sperry Vickers Representative.

Pressure requirements are above 1000 PSI.

Speed is above 1800 RPM.

Fluid does not meet the specifications of data sheet I-286-S.

Application requires an indirect drive.

Needs require application assistance.

Weight Lbs. (Approx.)

Flange Mounting	16
Foot Mounting	20

### Typical Model Code

PV8 6 A ~ F R S ~ 20 ~ CA ~ 11

Inline Piston Pump

Nominal Delivery (GPM) @ 1800 RPM

Medium Pressure Design A ~ 1000 PSI (Max.)

Pump Mounting F ~ Foot Bracket (Omit For Flange Mounting)

For Separate "Foot Bracket Kit" Order Model FB-A-10

Design Number Subject To Change. Installation Dimensions Remain As Shown For Design Numbers 20 Thru 29.

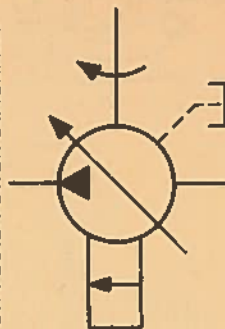
Single Side of Center

Pump Rotation (Viewing Shaft End) R ~ Right Hand (CW)

Control Design Number

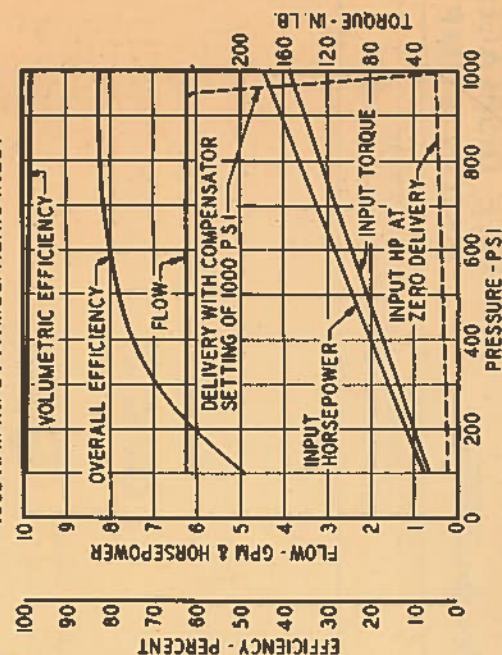
Pressure Compensator (250-1000 PSI)

### STANDARD GRAPHICAL SYMBOL FOR FLUID POWER DIAGRAMS



### TYPICAL PERFORMANCE CHARACTERISTICS

BASED ON OIL TEMPERATURE OF 120° F (100 SSU)  
1800 RPM INPUT-ATMOSPHERIC INLET





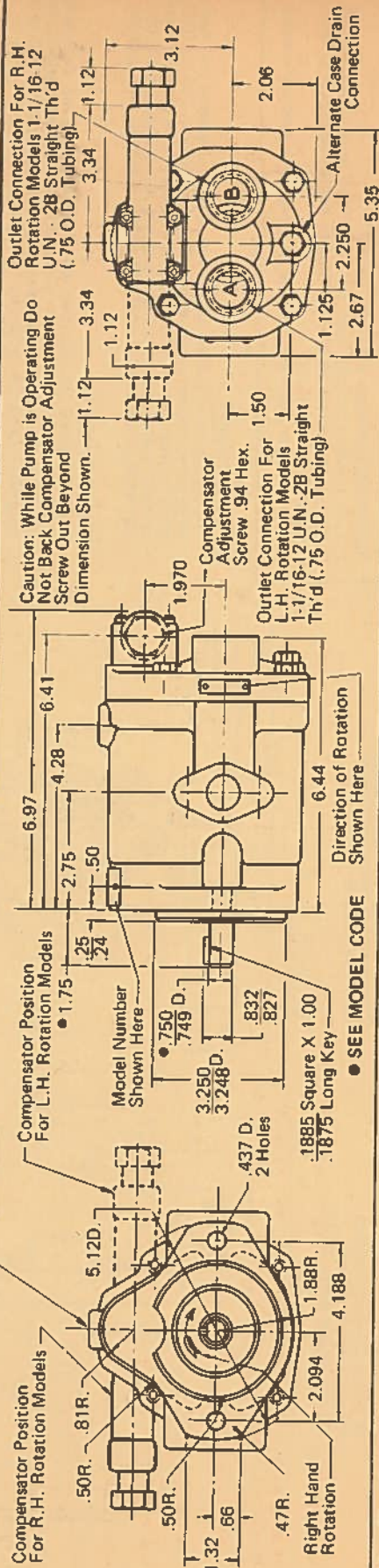
"CG" REMOTE COMPENSATOR  
SEE PAGE 508300B.1.

**SPERRY VICKERS**  
T.M.

## VARIABLE DISPLACEMENT PISTON PUMPS

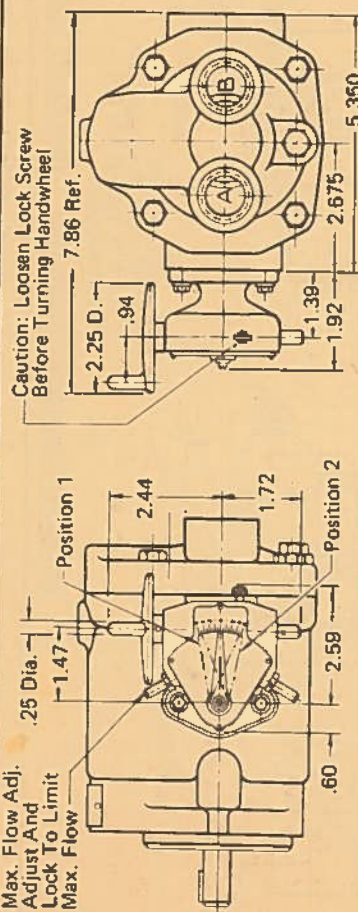
Case Drain Connection .562-18 UNF-2B  
Straight Th'd For .375 O.D. Tubing  
(See Notes)

**PVB5 AND PVB6-20 DESIGN (IN-LINE TYPE)  
WITH PRESSURE COMPENSATOR, HANDWHEEL AND LEVER CONTROLS**



## HANDWHEEL CONTROL

Provides manual selection of pump displacement. Handwheel controlled units may be operated on both sides of center permitting bi-directional fluid flow characteristics.

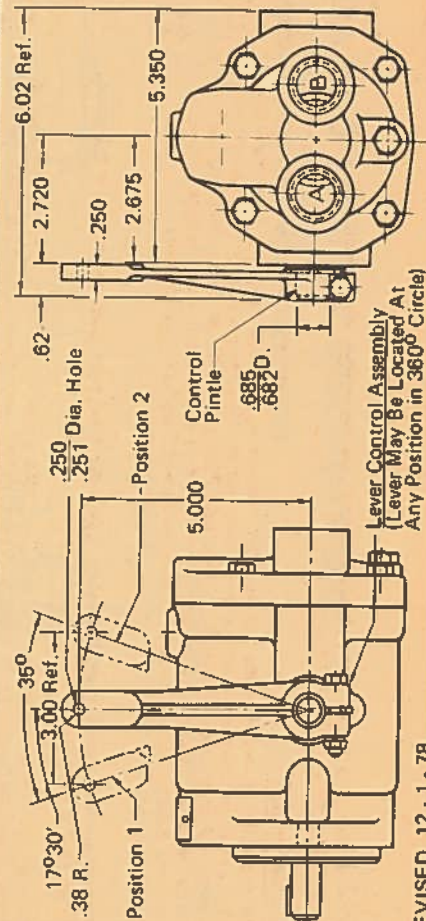


## PRESSURE COMPENSATOR CONTROLS

The pressure compensator automatically adjusts pump delivery to maintain volume requirements of a system at a preselected operating pressure. Maximum pump delivery is maintained to approximately 50 PSI below the pressure control setting before the compensator operates on one side of the pressure compensator. The pressure compensator has an adjustment range of 250 to 1500 PSI on "CM" models and 250 to 3000 on "C" models as designated in the model coding. Customer must limit PVB6 to 2000 PSI when using "C" compensator.

## LEVER CONTROL

Provides mechanical or manual selection of pump displacement. Lever controlled units may be operated on both sides of center permitting bidirectional fluid flow characteristics. Hand lever controls must be secured by suitable linkage arrangement to maintain desired setting. The control pinle may be rotated 17-1/2° on each side of center position to permit full reversal of flow. Pintle travel is limited to 35° by internal stops. Torque required to rotate control pinle is approximately 30 lbf-in at rated speed and pressure for the PVB5 and 20 lbf-in for the PVB6. (Note: Torque varies with speed and pressure.)



REvised 12-1-78

Shaft Rotation	Pointer Position	Handwheel Rotation From Zero	Outlet Port
R.H.	1	Clockwise	A
R.H.	2	Counter-Clockwise	B
L.H.	1	Clockwise	B
L.H.	2	Counter-Clockwise	A

Shaft Rotation	Lever Position	Outlet Port
R.H.	1	A
R.H.	2	B
L.H.	1	B
L.H.	2	A

**SPEIRY-VICKERS**  
TROY, MICHIGAN 48084

### PISTON PUMP IN-LINE TYPE

PVB5 & PVB6  
VARIABLE  
DISPLACEMENT

5 GPM  
3000 PSI  
OUTLET

6.5 GPM  
2000 PSI  
OUTLET

### PRESSURE COMPENSATOR HANDWHEEL & LEVER CONTROLS

**FLANGE  
OR FOOT  
MOUNTING**

DWG. NO.  
508300B



# SPERRY VICKERS VARIABLE DISPLACEMENT PISTON PUMPS

THRU SHAFT AND/OR SIDE PORTS  
WITH PRESSURE COMPENSATOR, HANDWHEEL AND LEVER CONTROLS

## General Data

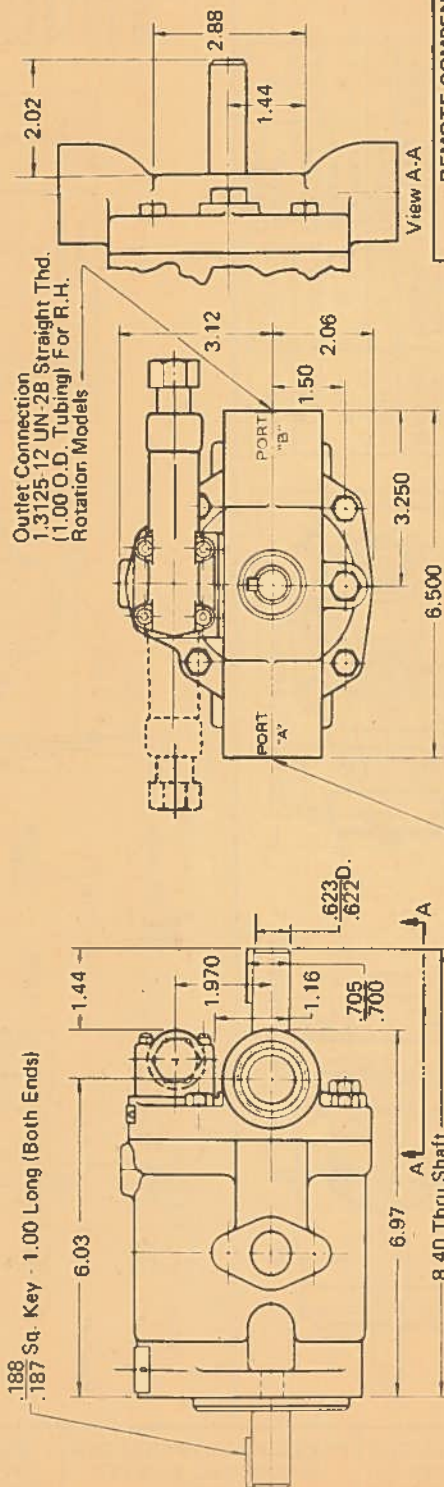
### Side Ports

Rated and maximum speeds, pressure and general performance of the side port pumps are identical to the standard units.

### Thru Shaft

Rated and maximum speeds, pressure and general performance of the thru shaft pumps are identical to the standard units, except the input torque is limited to 354 lbf-in.

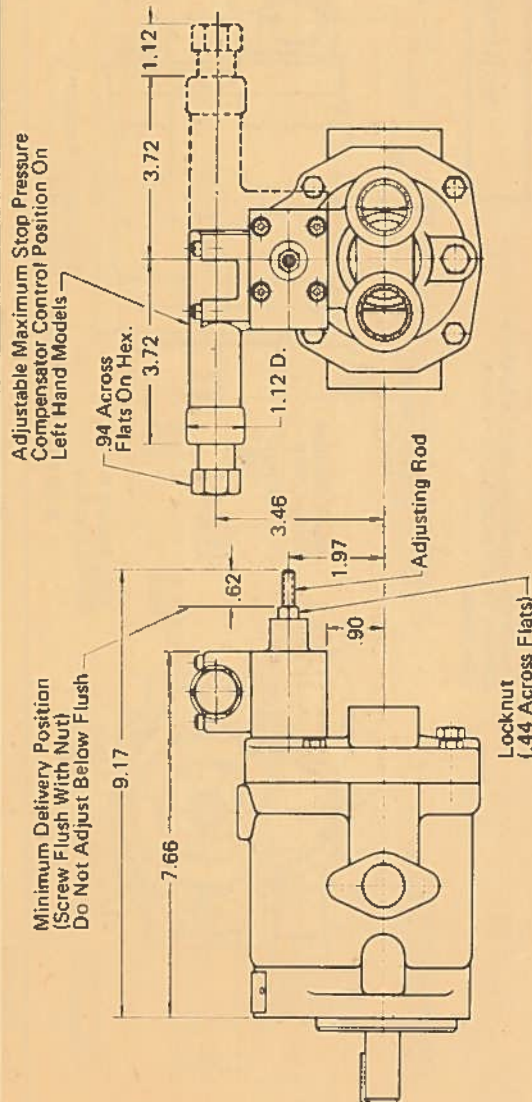
Note: Both shafts must have a direct drive only.



Outlet Connection  
1.3125-12 UN-2B Straight Thd.  
(1.00 O.D. Tubing) For R.H.  
Rotation Models

View A-A

## PRESSURE COMPENSATOR CONTROL - THRU SHAFT AND SIDE PORTS



Minimum Delivery Position  
(Screw Flush With Nut)  
Do Not Adjust Below Flush

Adjustable Maximum Stop Pressure  
Compensator Control Position On  
Left Hand Models

94 Across  
Flats On Hex.

Adjusting Rod

Locknut  
(.44 Across Flats)

## REMOTE COMPENSATOR "CG" (SEE MODEL CODE)

1/8-27 NPTF For "CG"  
Control Models  
Connect To Pressure  
Control, Such As C-175.



### Adjustment procedure for "CG" models

1. Turn pressure control (such as C-175) CCW to minimum setting.
2. Turn compensator adjustment plug to desired minimum pressure (250 PSI or higher).
3. Full pressure range can now be obtained with pressure control.

### Control Description

The adjustable maximum stop pressure control enables the maximum pump delivery to be externally adjusted from 25% to 100% while maintaining all of the standard features of a pressure compensated pump. To assist initial priming, manual adjustment control setting must be at least 40 percent of maximum flow position.

### Control Adjustment

Loosen locknut on adjusting rod. Turn adjusting rod clockwise (CW) to decrease maximum pump delivery or counterclockwise (CCW) to increase maximum pump delivery until desired setting is obtained. Secure this setting by tightening locknut.

### Note:

Not available with (X) thru shaft side port models.

## PRESSURE COMPENSATOR CONTROL WITH ADJUSTABLE MAXIMUM DISPLACEMENT STOP

508300B-1



**PVB5 AND PVB6 - 20 DESIGN  
VARIABLE DISPLACEMENT INLINE PISTON PUMP  
WITH DUAL RANGE PRESSURE COMPENSATOR CONTROL**

**Control Description**

The dual range pressure compensator control automatically adjusts pump delivery to maintain volume requirements of the system at either of two preselected operating pressures.

Maximum pump delivery is maintained to approximately 50 PSI below either of the pressure control settings before being reduced.

Electric or hydraulic control of the dual range pressure compensator is available in two pressure ranges of 250 to 1500 PSI or 250 to 3000 PSI. Control type and pressure range is designated in the model code.

**Control Features**

The dual range pressure compensator offers the following advantages:

1. Low - pressure setting for -  
A-Low horsepower start-up  
B-Tool or equipment tryout  
C-Low power consumption and low heat generation  
when the machine or circuit is at rest
2. High - pressure setting for -  
A-Machining or circuit applications

**Control Adjustment**

1. With the directional valve de-energized, loosen locknut "5" and turn the adjusting screw "4" to the desired first stage pressure setting and tighten locknut "5".
2. With solenoid de-energized, turn adjusting spool "1" counterclockwise (CCW) until nut "3" is bottomed in adjusting screw slot. (Second stage setting is now equal to first stage pressure setting). Turn adjusting spool clockwise (CW) to desired second stage pressure requirements. (One complete turn of adjusting spool equals approximately 600 PSI on "CD" models, and 300 PSI on "CMD" models.) Energize solenoid and check pressure setting. De-energize solenoid and re-adjust if necessary. Secure this setting by tightening locknut "2".

**Note:**

Not available with (X) thru shaft side port models.

**▲ Note:**

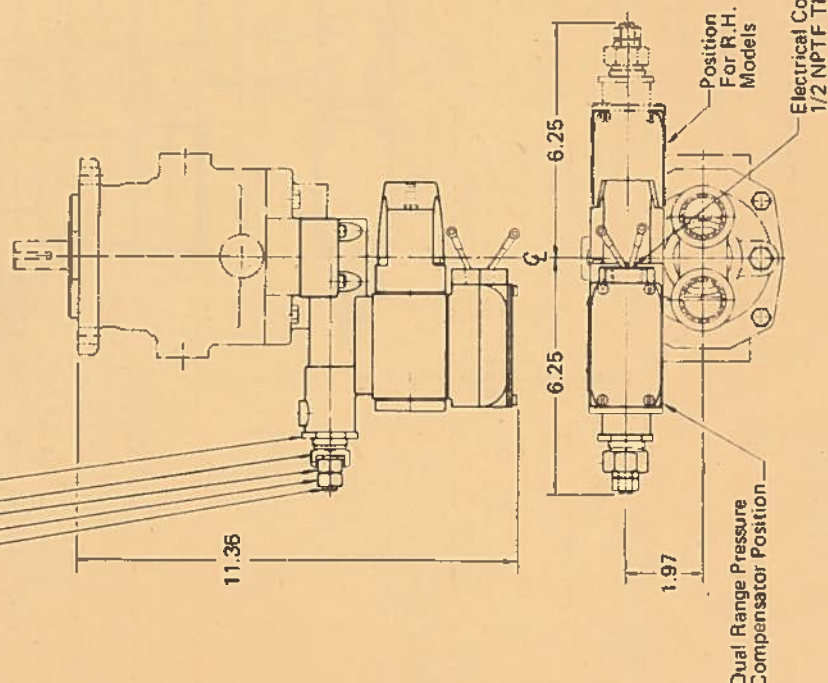
Any sliding spool valve, if held shifted under pressure for long periods of time, may stick and not spring return due to fluid residue formation and, therefore, should be cycled periodically to prevent this from happening.

▲ Solenoid data (110 V ac 50 Hz and 115/120 V ac 60 Hz)

Solenoid Current	Inrush amps (R.M.S.)*	Holding amps
115/120 V ac 60 Hz - 110 V ac 50 Hz	2.0	.4

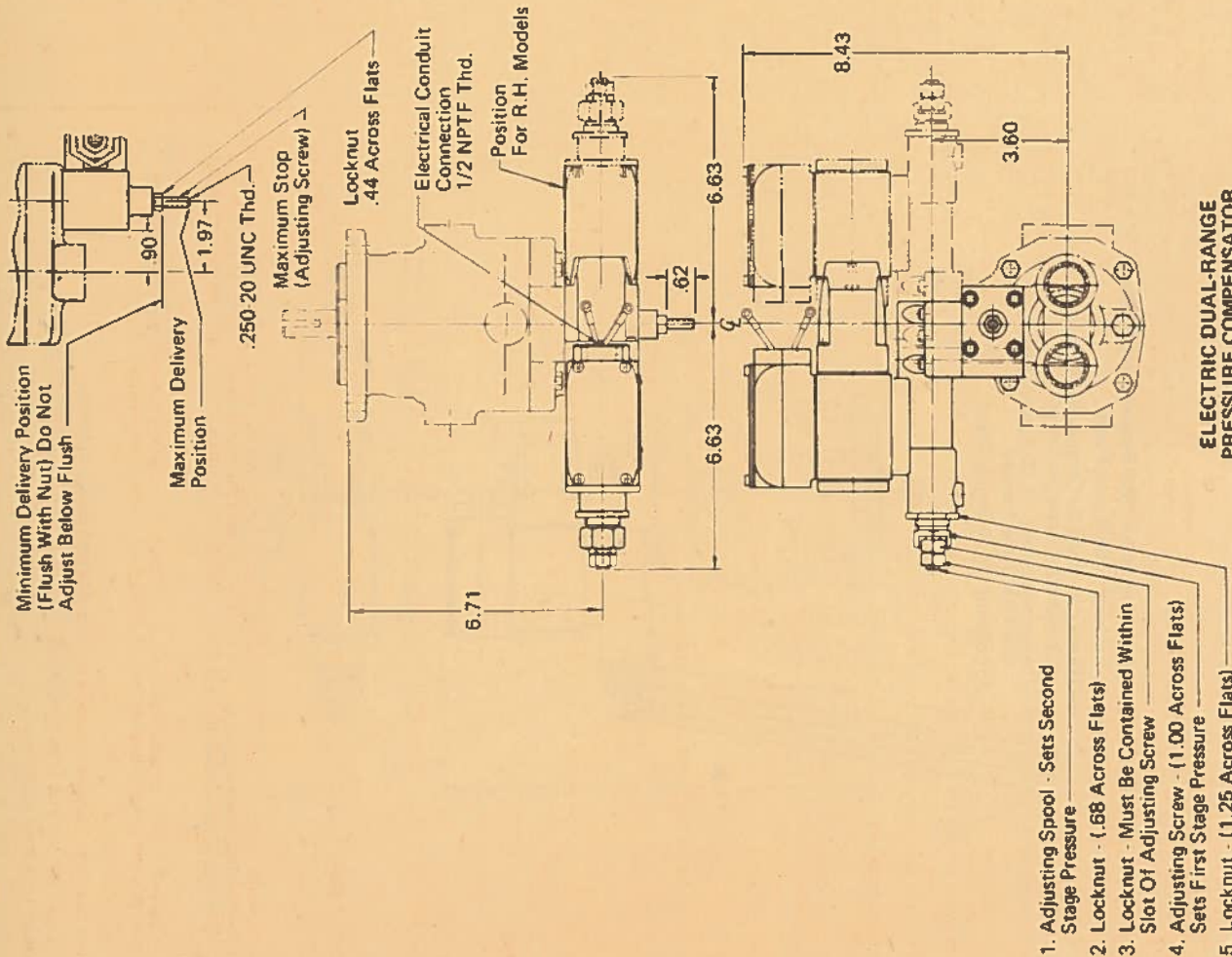
\* Maximum peak inrush amps approximately 1.4 x R.M.S. value shown.

1. Adjusting Spool - Sets Second Stage Pressure
2. Locknut - (.68 Across Flats)
3. Locknut - Must Be Contained Within Slot Of Adjusting Screw As Shown
4. Adjusting Screw - (1.00 Across Flats) Sets First Stage Pressure
5. Locknut - (1.25 Across Flats)



**ELECTRIC DUAL-RANGE  
PRESSURE COMPENSATOR CONTROL**





**ELECTRIC DUAL-RANGE  
PRESSURE COMPENSATOR  
AND MAXIMUM STOP  
CONTROL**

**PVB5 AND PVB6 - 20 DESIGN  
VARIABLE DELIVERY INLINE PISTON PUMP WITH DUAL RANGE  
PRESSURE COMPENSATOR CONTROL &  
MAXIMUM FLOW ADJUSTABLE STOP**

**Control Description**

The dual range pressure compensator control with max. flow adjustable stop automatically adjusts pump delivery to maintain volume requirements of the system at either of two preselected operating pressures.

Maximum pump delivery is maintained to approximately 50 PSI below either of the pressure control settings before being reduced. The maximum delivery is adjustable and can be set at any setting from 25% to 100% flow. (See page 508300B.)

Electric or hydraulic control of the dual range pressure compensator is available in two pressure ranges of 250 to 1500 PSI or 250 to 3000 PSI. Control type and pressure range is designated in the model code.

**Compensator Control**

1. With the directional valve de-energized, loosen locknut "5" and turn the adjusting screw "4" to the desired first stage pressure setting and tighten locknut "5".
2. With directional valve de-energized, turn adjusting spool "1" counter-clockwise until nut "3" is bottomed in adjusting screw slot. (Second stage setting is now equal to first stage pressure setting). Turn adjusting spool clockwise to desired second stage pressure requirements (one complete turn of adjusting spool equals approximately 600 PSI on "CCD" models, and 300 PSI on "CMCD" models). Energize solenoid and check pressure setting. De-energize solenoid and re-adjust pressure if necessary. Secure this setting by tightening locknut "2".

**Maximum Flow Adjustment**

With the system pressure below both compensator settings, loosen maximum stop adjusting screw locknut and adjust screw to desired flow position (turning screw clockwise decreases flow and turning screw counterclockwise increases flow). To lock screw in position tighten locknut. To assist initial priming, adjust control setting to at least 40% of maximum flow position.

**Note:**

Not available with (X) thru shaft side port models.

**▲ Note:**

Any sliding spool valve, if held shifted under pressure for long periods of time, may stick and not spring return due to fluid residue formation and, therefore, should be cycled periodically to prevent this from happening.

▲ Solenoid data (see note on page 508300B-2).



## General Data

These units are of the axial piston, variable displacement, in-line design, displacement is varied by means of either a pressure compensator, handwheel, or lever control.

## Installation Information

Horizontal mounting is recommended to maintain necessary case fluid level. The case drain line must be full size unrestricted and connected from the uppermost drain port directly to the reservoir in such a manner that the case remains filled with fluid. Piping of drain line must prevent siphoning. Pipe drain line so that it terminates below reservoir fluid level. No other lines are to be connected to this drain line. Caution must be exercised to never exceed 5 PSI unit case pressure.

## Starting

Before starting, fill case with system fluid thru uppermost drain port. Case must be kept full at all times to provide internal lubrication.

When first starting, it may be necessary to bleed air from pump outlet line to permit priming and reduce noise. Bleed by loosening an outlet connection until solid stream of fluid appears. An air-bleed valve is available for this purpose. See drawing 521601.

To assist initial priming, control setting must be at least 40% of maximum flow position.

## Operating Specifications

Model Number	Theoretical Displacement In. 3/Rev.	Delivery GPM At		Operating Speed RPM (Maximum)	Pressure PSI (Maximum)	Sound Data dB(A)	Input Horsepower At Max. PSI & 1800 RPM	Weight Lb. (Approx.)	
		1800 RPM	Max. RPM					Flange Mtg.	Foot Mtg.
PVB5	.643	5	10	3600	3000	59	10	16	20
PVB6	.843	6.5	11.4	3200	2000	59	8.75		

Refer to curve for inlet pressure requirements.

■ Straight port model at cutoff, 1200 RPM, 2000 PSI pressure, SAE 10W oil at 120°F., 5" Hg inlet vacuum per NFPA standard T3.9.70.12.

## Drive Rotation

Shaft rotation is not reversible and must be specified when ordering. (See drawing 517010 for indirect drive data).

## Case Pressure

Not to exceed..... 5 PSI

## Handwheel Data

Approximate displacement for one turn of handwheel is .16 in.<sup>3</sup>/rev. for 5 size and .21 in.<sup>3</sup>/rev. for 6 size.

## Filtration

Pressure or Return Line..... 35 Micron Absolute or Less Inlet..... 149 Microns

## Fluids

Clean petroleum antiwear industrial hydraulic oil or automotive crankcase oil designated SC, SD or SE. Running viscosity range 70-250 SUS. Operating temperature 120°F. recommended, 150°F. usual maximum. Refer to data sheet 1-286-S for hydraulic fluid and temperature recommendations.

This unit is designed to meet specifications as outlined. To insure maximum unit performance, in conjunction with your specific application, consult your application engineer if you:

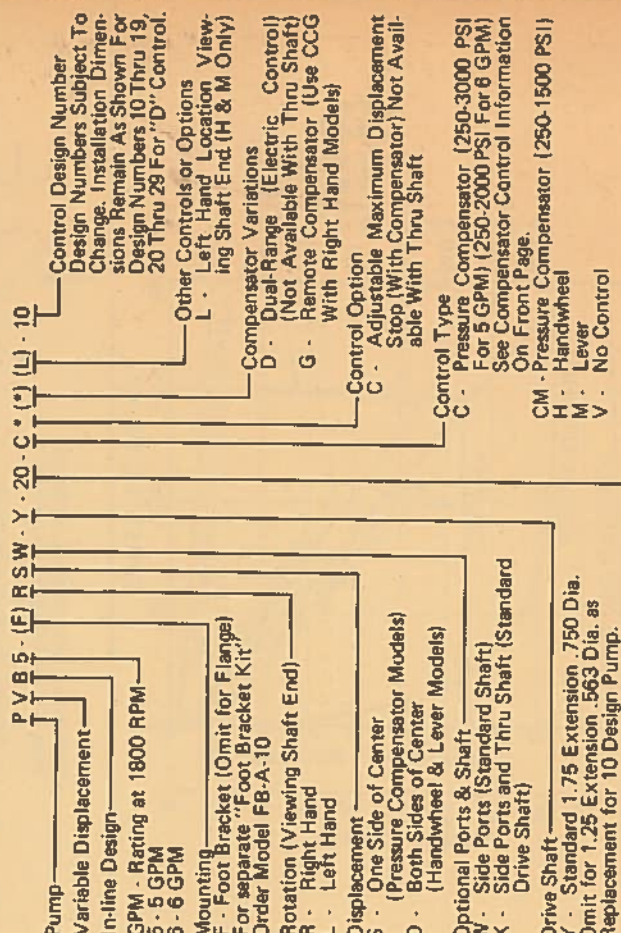
Speed is above maximum RPM.

Fluid does not meet the specifications of data sheet 1-286-S.

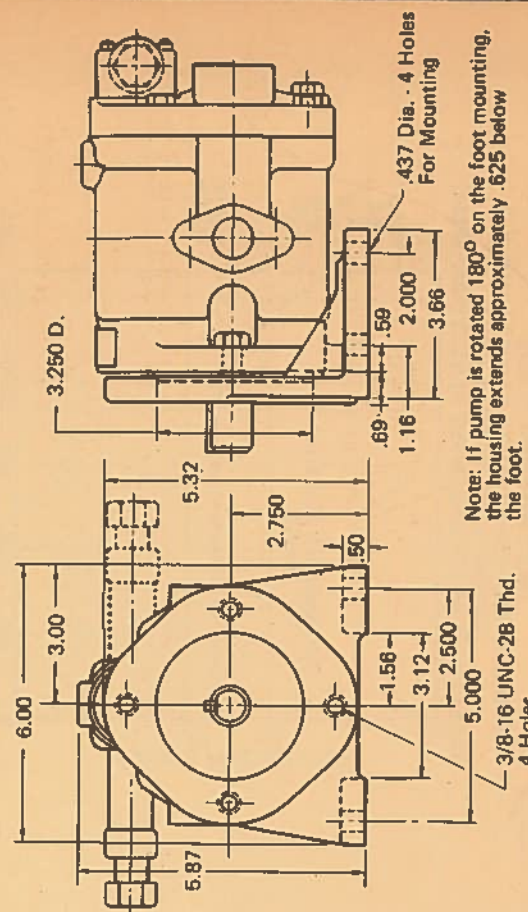
Mounting attitude is other than horizontal.

Needs require application assistance.

## Model Code



## FOOT MOUNTING - ALL MODELS



Note: If pump is rotated 180° on the foot mounting, the housing extends approximately .625 below the foot.

508300B-4

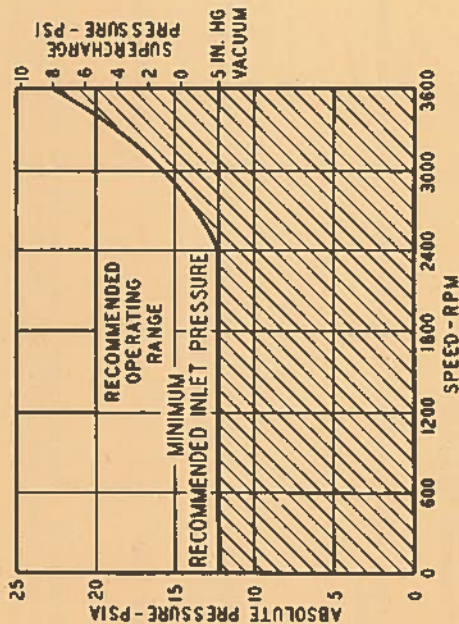
SEC. C



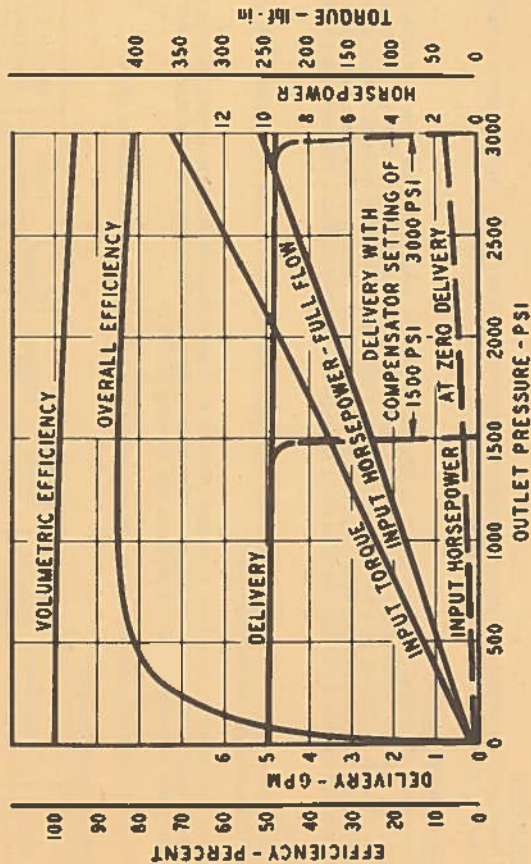
# TYPICAL PERFORMANCE CURVES

## MODEL PVB5

INLET PRESSURE CURVE  
BASED ON OIL TEMPERATURE OF 120° F (100 SUS)  
VISCOSITY OF 150 SSU @ 100° F  
INLET PRESSURE REQUIREMENT VERSUS PUMP SPEED

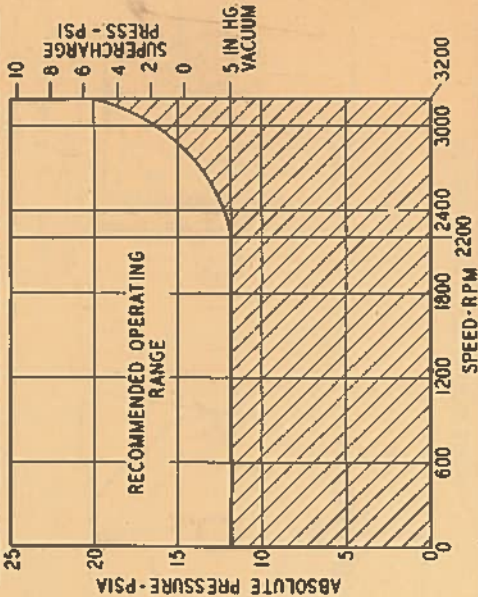


PERFORMANCE CHARACTERISTICS  
BASED ON OIL TEMPERATURE OF 120° F (100 SUS)  
1800 RPM INPUT - ATMOSPHERIC INLET

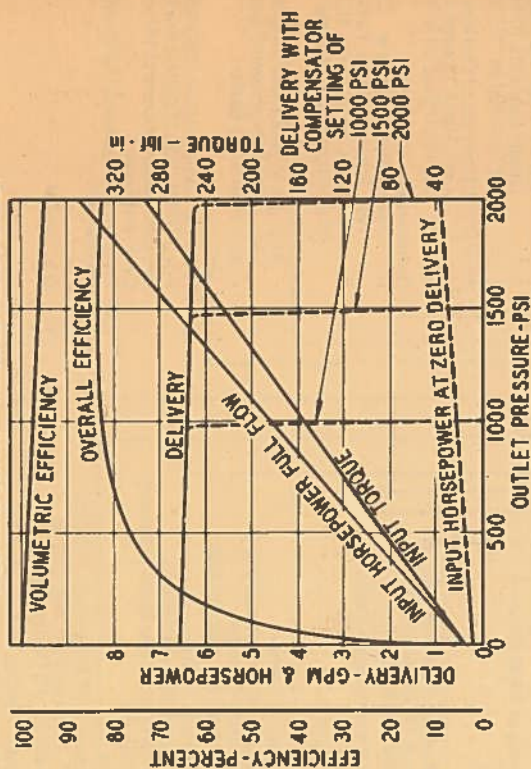


## MODEL PVB6

INLET PRESSURE CURVE  
BASED ON OIL TEMPERATURE OF 120° F (100 SUS)  
VISCOSITY OF 150 SSU @ 100° F  
INLET PRESSURE REQUIREMENT VERSUS PUMP SPEED



PERFORMANCE CHARACTERISTICS  
BASED ON OIL TEMPERATURE OF 120° F (100 SUS)  
1800 RPM INPUT - ATMOSPHERIC INLET



STANDARD GRAPHICAL SYMBOL  
FOR FLUID POWER DIAGRAMS



COMPENSATOR CONTROL



**SPERRY VICKERS**  
TROY, MICHIGAN 48084

**PISTON  
PUMP  
IN-LINE TYPE**

**PVB10 & PVB15  
VARIABLE  
DISPLACEMENT**

**10 GPM.  
3000 PSI  
OUTLET**

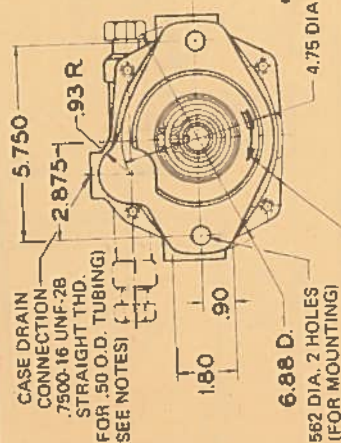
**15 GPM.  
2000 PSI  
OUTLET**

**PRESSURE COMPENSATOR,  
HANDWHEEL &  
LEVER CONTROLS**

**FOOT AND  
FLANGE  
MOUNTING**

**DWG. NO.  
508400A**

SHAFT DIMENSION "A"	
• SEE CODE FOR MODELS	2.31
STANDARD	1.75
OPTIONAL	1.75



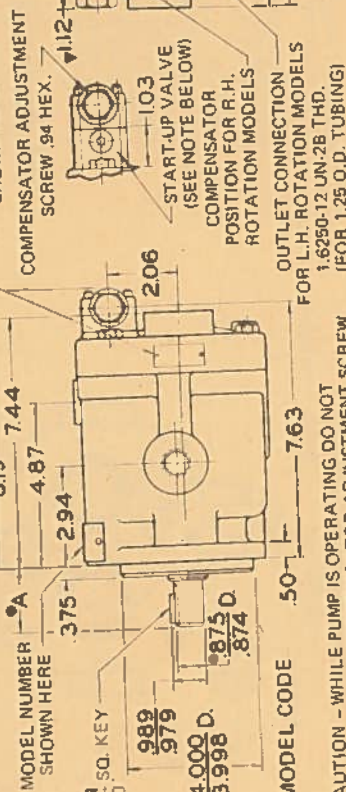
RIGHT HAND ROTATION

• SEE MODEL CODE

CAUTION - WHILE PUMP IS OPERATING DO NOT  
BACK COMPENSATOR ADJUSTMENT SCREW  
OUT BEYOND DIMENSION SHOWN

PVB10 AND PVB15 - 30 DESIGN (IN-LINE TYPE)

WITH PRESSURE COMPENSATOR, HANDWHEEL AND LEVER CONTROLS



MODEL NUMBER  
SHOWN HERE

.251 SQ. KEY

4.000 D.  
3.998

989  
979

375

2.94

4.87

8.19

7.44

7.63

50

7.16

2.250

7.16

2.2

1.39

1.92

1.750

1.47

.62

1.72

2.44

.875

35°

17° 30'

.300 REF.

38 R

.250 DIA. HOLE

.251

5.000

6.85 D.

6.80

1.75

1.72

2.44

.875

35°

17° 30'

.300 REF.

38 R

.250 DIA. HOLE

.251

5.000

6.85 D.

6.80

1.75

1.72

2.44

.875

35°

17° 30'

.300 REF.

38 R

.250 DIA. HOLE

.251

5.000

6.85 D.

6.80

1.75

1.72

2.44

.875

35°

17° 30'

.300 REF.

38 R

.250 DIA. HOLE

.251

5.000

6.85 D.

6.80

1.75

1.72

2.44

.875

35°

17° 30'

.300 REF.

38 R

.250 DIA. HOLE

.251

5.000

6.85 D.

6.80

1.75

1.72

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.875

35°

17° 30'

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6.85 D.

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35°

17° 30'

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38 R

.250 DIA. HOLE

.251

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6.85 D.

6.80

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2.44

.875

35°

17° 30'

.300 REF.

38 R

.250 DIA. HOLE

.251

5.000

6.85 D.

6.80

1.75

1.72

2.44

.875

35°

17° 30'

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35°

17° 30'

.300 REF.

38 R

.250 DIA. HOLE

.251

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6.85 D.

6.80

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.875

35°

17° 30'

.300 REF.

38 R

.250 DIA. HOLE

.251

5.000

6.85 D.

6.80

1.75

1.72

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35°

17° 30'

.300 REF.

38 R

.250 DIA. HOLE

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6.85 D.

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35°

17° 30'

.300 REF.

38 R

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6.85 D.

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35°

17° 30'

.300 REF.

38 R

.250 DIA. HOLE

.251

5.000

6.85 D.

6.80

1.75

1.72

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.875

35°

17° 30'

.300 REF.

38 R

.250 DIA. HOLE

.251

5.000

6.85 D.

6.80

1.75

1.72

2.44

.875

35°

17° 30'

.300 REF.

38 R

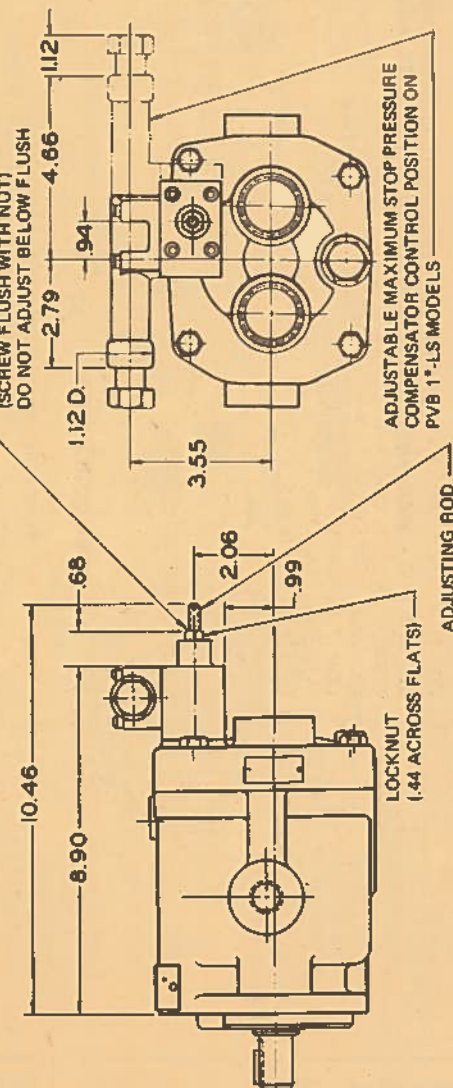
.250 DIA. HOLE

.251

5.000

6.85 D.



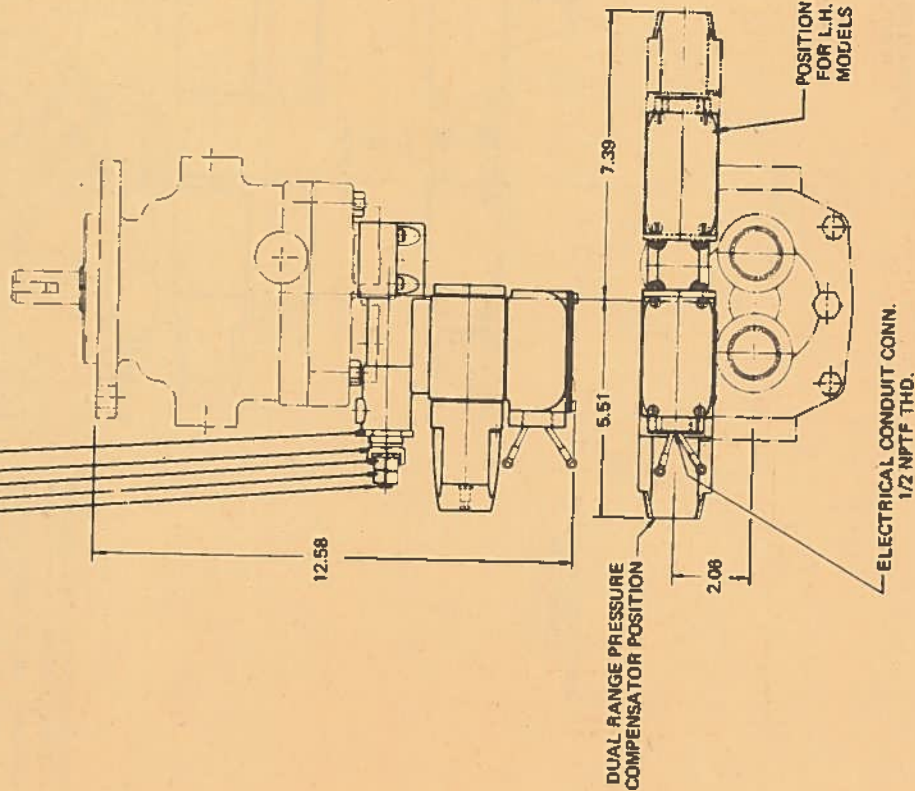


## PRESSURE COMPENSATOR CONTROL WITH ADJUSTABLE MAXIMUM DISPLACEMENT STOP

508400A-1



1. ADJUSTING SPOOL - SETS SECOND STAGE PRESSURE
2. LOCKNUT - (.68 ACROSS FLATS)
3. LOCKNUT - MUST BE CONTAINED WITHIN SLOT OF ADJUSTING SCREW AS SHOWN
4. ADJUSTING SCREW - (1.00 ACROSS FLATS) SETS FIRST STAGE PRESSURE
5. LOCKNUT - (1.25 ACROSS FLATS)



**ELECTRIC DUAL-RANGE  
PRESSURE COMPENSATOR CONTROL**

## PVB10 AND PVB15 - 30 DESIGN VARIABLE DELIVERY INLINE PISTON PUMP WITH DUAL RANGE PRESSURE COMPENSATOR CONTROL

### CONTROL DESCRIPTION

THE DUAL RANGE PRESSURE COMPENSATOR CONTROL AUTOMATICALLY ADJUSTS PUMP DELIVERY TO MAINTAIN VOLUME REQUIREMENTS OF THE SYSTEM AT EITHER OF TWO PRESELECTED OPERATING PRESSURES.

MAXIMUM PUMP DELIVERY IS MAINTAINED TO APPROXIMATELY 50 PSI BELOW EITHER OF THE PRESSURE CONTROL SETTINGS BEFORE BEING REDUCED.

ELECTRIC CONTROL OF THE DUAL RANGE PRESSURE COMPENSATOR IS AVAILABLE IN TWO PRESSURE RANGES OF 250 TO 1500 PSI OR 250 TO 3000 PSI. CONTROL TYPE AND PRESSURE RANGE IS DESIGNATED IN THE MODEL CODE.

### CONTROL FEATURES

THE DUAL RANGE PRESSURE COMPENSATOR OFFERS THE FOLLOWING ADVANTAGES:

1. LOW - PRESSURE SETTING FOR -  
A - LOW HORSEPOWER START-UP  
B - TOOL OR EQUIPMENT TRYOUT  
C - LOW POWER CONSUMPTION AND LOW HEAT GENERATION  
WHEN THE MACHINE OR CIRCUIT IS AT REST
2. HIGH - PRESSURE SETTING FOR -  
A - MACHINING OR CIRCUIT APPLICATIONS

### CONTROL ADJUSTMENT

1. WITH THE DIRECTIONAL VALVE DE-ENERGIZED, LOOSEN LOCKNUT "5" AND TURN THE ADJUSTING SCREW "4" TO THE DESIRED FIRST STAGE PRESSURE SETTING AND TIGHTEN LOCKNUT "5".
2. WITH SOLENOID DE-ENERGIZED, TURN ADJUSTING SPOOL "1" COUNTER-CLOCKWISE (CCW) UNTIL NUT "3" IS BOTTOMED IN ADJUSTING SCREW SLOT. (SECOND STAGE SETTING IS NOW EQUAL TO FIRST STAGE PRESSURE SETTING.) TURN ADJUSTING SPOOL CLOCKWISE (CW) TO DESIRED SECOND STAGE PRESSURE REQUIREMENTS. (ONE COMPLETE TURN OF ADJUSTING SPOOL EQUALS APPROXIMATELY 800 PSI ON "CD" MODELS, AND 300 PSI ON "CMD" MODELS.) ENERGIZE SOLENOID AND CHECK PRESSURE SETTING. DE-ENERGIZE SOLENOID AND RE-ADJUST IF NECESSARY. SECURE THIS SETTING BY TIGHTENING LOCKNUT "2".

NOTE: NOT AVAILABLE WITH (X) THRU SHAFT MODELS.

▲ NOTE: ANY SLIDING SPOOL VALVE, IF HELD SHIFTED UNDER PRESSURE FOR LONG PERIODS OF TIME, MAY STICK AND NOT SPRING RETURN DUE TO FLUID RESIDUE FORMATION AND, THEREFORE, SHOULD BE CYCLED PERIODICALLY TO PREVENT THIS FROM HAPPENING.

▲ SOLENOID DATA (110 V ac 50 Hz AND 115/120 V ac 60 Hz)

SOLENOID CURRENT	INRUSH amps (R.M.S.)★	HOLDING amps
115/120 V ac 60 Hz - 110 V ac 50 Hz	2.0	.4

★ MAXIMUM PEAK INRUSH amps APPROXIMATELY 1.4 X R.M.S. VALUE SHOWN.



MINIMUM DELIVERY  
POSITION (FLUSH WITH NUT)  
DO NOT ADJUST BELOW FLUSH

MAXIMUM DELIVERY  
POSITION

.250-20 UNC THD.  
MAXIMUM STOP  
(ADJUSTING SCREW)  
LOCKNUT  
.44 ACROSS FLATS

7.94

ELECTRICAL CONDUIT  
CONNECTION  
1/2 NPTF THD.

POSITION  
FOR L.H.  
MODELS

.94

5.89

7.77

8.52

1. ADJUSTING SPOOL - SETS SECOND  
STAGE PRESSURE

2. LOCKNUT - (.68 ACROSS FLATS)

3. LOCKNUT - MUST BE CONTAINED  
WITHIN SLOT OF ADJUSTING  
SCREW

4. ADJUSTING SCREW - (.100 ACROSS  
FLATS) SETS FIRST STAGE  
PRESSURE

5. LOCKNUT - (.125 ACROSS FLATS)

ELECTRIC DUAL-RANGE  
PRESSURE COMPENSATOR  
AND MAXIMUM STOP  
CONTROL

# PVB10 AND PVB15 - 30 DESIGN VARIABLE DELIVERY INLINE PISTON PUMP WITH DUAL RANGE PRESSURE COMPENSATOR CONTROL & MAXIMUM FLOW ADJUSTABLE STOP

## CONTROL DESCRIPTION

THE DUAL RANGE PRESSURE COMPENSATOR CONTROL WITH MAX. FLOW ADJUSTABLE STOP AUTOMATICALLY ADJUSTS PUMP DELIVERY TO MAINTAIN VOLUME REQUIREMENTS OF THE SYSTEM AT EITHER OF TWO PRE-SELECTED OPERATING PRESSURES.

MAXIMUM PUMP DELIVERY IS MAINTAINED TO APPROXIMATELY 90 PSI BELOW EITHER OF THE PRESSURE CONTROL SETTINGS BEFORE BEING REDUCED. THE MAXIMUM DELIVERY IS ADJUSTABLE AND CAN BE SET AT ANY SETTING FROM 25% TO 100% FLOW.

ELECTRIC CONTROL OF THE DUAL RANGE PRESSURE COMPENSATOR IS AVAILABLE IN TWO PRESSURE RANGES OF 250 TO 1500 PSI OR 250 TO 3000 PSI. CONTROL TYPE AND PRESSURE RANGE IS DESIGNATED IN THE MODEL CODE.

## COMPENSATOR CONTROL

1. WITH THE DIRECTIONAL VALVE DE-ENERGIZED, LOOSEN LOCKNUT "6" AND TURN THE ADJUSTING SCREW "4" TO THE DESIRED FIRST STAGE PRESSURE SETTING AND TIGHTEN LOCKNUT "5".

2. WITH DIRECTIONAL VALVE DE-ENERGIZED, TURN ADJUSTING SPOOL "1" COUNTERCLOCKWISE UNTIL NUT "3" IS BOTTOMED IN ADJUSTING SCREW SLOT. (SECOND STAGE SETTING IS NOW EQUAL TO FIRST STAGE PRESSURE SETTING.) TURN ADJUSTING SPOOL CLOCKWISE TO DESIRED SECOND STAGE PRESSURE REQUIREMENTS (ONE COMPLETE TURN OF ADJUSTING SPOOL EQUALS APPROXIMATELY 800 PSI ON "CCD" MODELS AND 300 PSI ON "CMCD" MODELS.) ENERGIZED SOLENOID AND CHECK PRESSURE SETTING. DE-ENERGIZED SOLENOID AND RE-ADJUST PRESSURE SETTING IF NECESSARY. SECURE THIS SETTING BY TIGHTENING LOCKNUT "2".

## MAXIMUM FLOW ADJUSTMENT

WITH THE SYSTEM PRESSURE BELOW BOTH COMPENSATOR SETTINGS, LOOSEN MAXIMUM STOP ADJUSTING SCREW LOCKNUT AND ADJUST SCREW TO DESIRED FLOW POSITION (TURNING SCREW CLOCKWISE DECREASES FLOW AND TURNING SCREW COUNTERCLOCKWISE INCREASES FLOW). TO LOCK SCREW IN POSITION TIGHTEN LOCKNUT. TO ASSIST INITIAL PRIMING, ADJUST CONTROL SETTING TO AT LEAST 40% OF MAXIMUM FLOW POSITION.

NOTE: NOT AVAILABLE WITH (X) THRU SHAFT MODELS.

▲ NOTE: ANY SLIDING SPOOL VALVE, IF HELD SHIFTED UNDER PRESSURE FOR LONG PERIODS OF TIME, MAY STICK AND NOT SPRING RETURN DUE TO FLUID RESIDUE FORMATION AND, THEREFORE, SHOULD BE CYCLED PERIODICALLY TO PREVENT THIS FROM HAPPENING.

▲ SOLENOID DATA (SEE NOTE ON PAGE 2)



## GENERAL DATA

THESE UNITS ARE OF THE AXIAL PISTON, VARIABLE DISPLACEMENT, IN-LINE DESIGN, DISPLACEMENT IS VARIED BY MEANS OF EITHER A PRESSURE COMPENSATOR, HANDWHEEL, OR LEVER CONTROL.

## INSTALLATION INFORMATION

HORIZONTAL MOUNTING IS RECOMMENDED TO MAINTAIN NECESSARY CASE FLUID LEVEL. THE CASE DRAIN LINE MUST BE FULL SIZE UNRESTRICTED AND CONNECTED FROM THE UPPERMOST DRAIN PORT DIRECTLY TO THE RESERVOIR IN SUCH A MANNER THAT THE CASE REMAINS FILLED WITH FLUID. PIPING OF DRAIN LINE MUST PREVENT SIPHONING. PIPE DRAIN LINE SO THAT IT TERMINATES BELOW RESERVOIR FLUID LEVEL. NO OTHER LINES ARE TO BE CONNECTED TO THIS DRAIN LINE. CAUTION MUST BE EXERCISED TO NEVER EXCEED 5 PSI UNIT CASE PRESSURE.

## STARTING

BEFORE STARTING, FILL CASE WITH SYSTEM FLUID THRU UPPERMOST DRAIN PORT. CASE MUST BE KEPT FULL AT ALL TIMES TO PROVIDE INTERNAL LUBRICATION.

WHEN FIRST STARTING, IT MAY BE NECESSARY TO BLEED AIR FROM PUMP OUTLET LINE TO PERMIT PRIMING AND REDUCE NOISE. BLEED BY LOOSENING AN OUTLET CONNECTION UNTIL SOLID STREAM OF FLUID APPEARS. AN AIRBLEED VALVE IS AVAILABLE FOR THIS PURPOSE. SEE DRAWING 521601.

TO ASSIST INITIAL PRIMING, CONTROL SETTING MUST BE AT LEAST 40% OF MAXIMUM FLOW POSITION.

## OPERATING SPECIFICATIONS

MODEL NUMBER	THEORETICAL DISPLACEMENT IN. <sup>3</sup> /REV.	DELIVERY GPM AT		OPERATING SPEED RPM (MAXIMUM)	PRESSURE PSI (MAXIMUM)	SOUND DATA DB(A)	INPUT HORSEPOWER AT MAX. PSI & 1800 RPM
		1800 RPM	MAX. RPM				
PV810	1.29	10	18	3200	3000	81	20
PV815	2.01	15.7	26.2	3000	2000	81	21

REFER TO CURVE FOR INLET PRESSURE REQUIREMENTS.

■ FULL STROKE, 1800 RPM, MAXIMUM PRESSURE, SAE 10W OIL AT 120°F., 5" Hg INLET VACUUM PER NFPA STANDARD T3.9.70.12.

## DRIVE ROTATION

SHAFT ROTATION IS NOT REVERSIBLE AND MUST BE SPECIFIED WHEN ORDERING.

## HANDWHEEL DATA

NOMINAL DISPLACEMENT FOR ONE TURN OF HANDWHEEL IS .32 IN.<sup>3</sup>/REV. FOR 10 SIZE AND 5 IN.<sup>3</sup>/REV. FOR 15 SIZE.

## FILTRATION

PRESSURE OR RETURN LINE INLET.

35 MICRON ABSOLUTE OR LESS

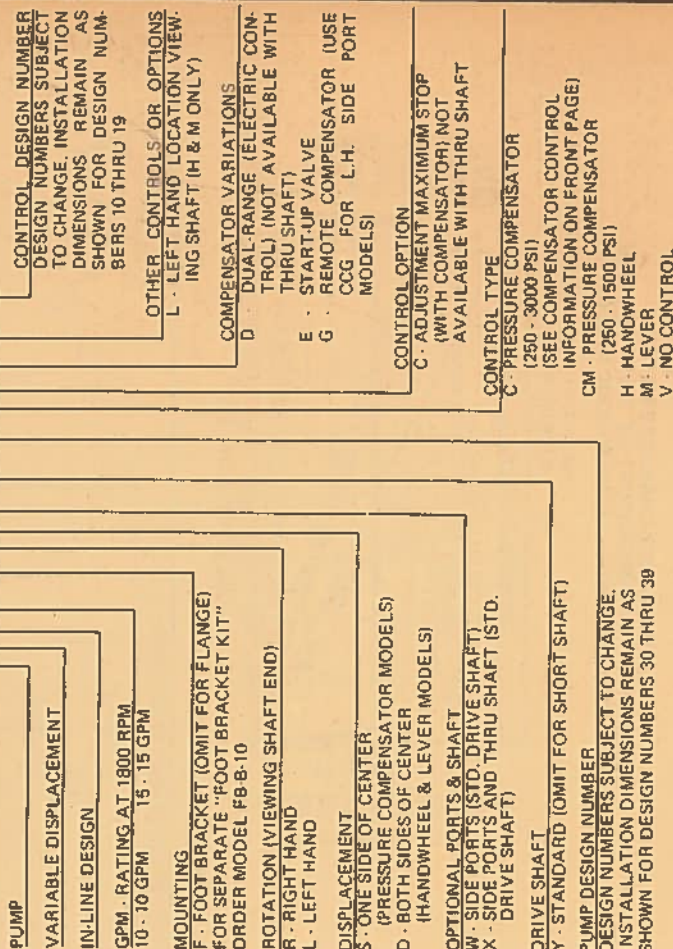
## FLUIDS

CLEAN PETROLEUM ANTIWEAR INDUSTRIAL HYDRAULIC OIL OR AUTOMOTIVE CRANKCASE OIL DESIGNATED SC, SD OR SE. RUNNING VISCOSITY RANGE 70-250 SUS. OPERATING TEMPERATURE 120°F. RECOMMENDED, 150°F. USUAL MAXIMUM. REFER TO DATA SHEET I-286-S FOR HYDRAULIC FLUID AND TEMPERATURE RECOMMENDATIONS. ALSO SEE FLUID LIFE CHART 507000.

THIS UNIT IS DESIGNED TO MEET SPECIFICATIONS AS OUTLINED. TO INSURE MAXIMUM UNIT PERFORMANCE, IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION, CONSULT YOUR APPLICATION ENGINEER IF YOUR:

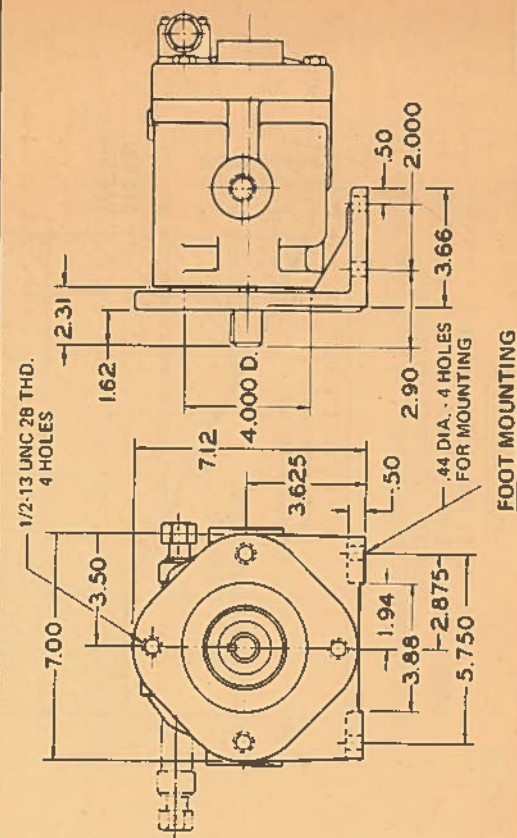
FLUID DOES NOT MEET SPECIFICATIONS SHOWN ON DATA SHEET I-286-S.  
APPLICATION REQUIRES AN INDIRECT DRIVE.  
NEEDS REQUIRE APPLICATION ASSISTANCE.

## TYPICAL MODEL CODE



## WEIGHT LB. (APPROX.)

FLANGE MOUNTING.....31  
FOOT MOUNTING.....36

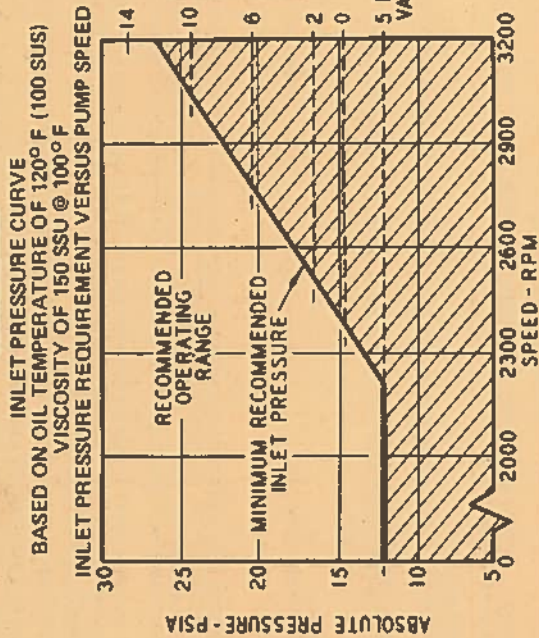


508400A-4

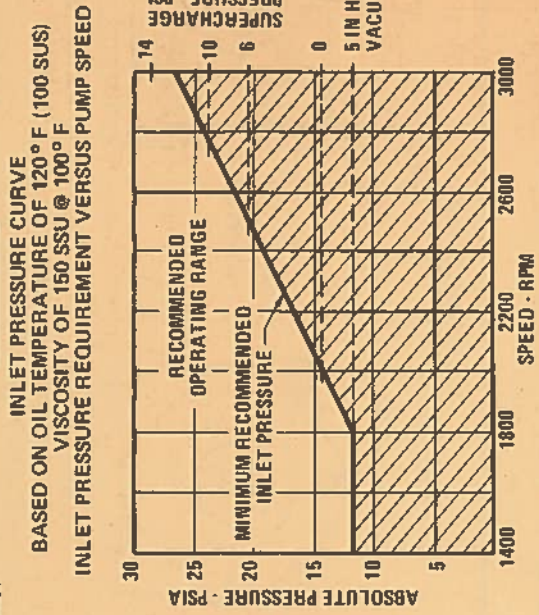


TYPICAL PERFORMANCE CURVES

PVB10 SERIES

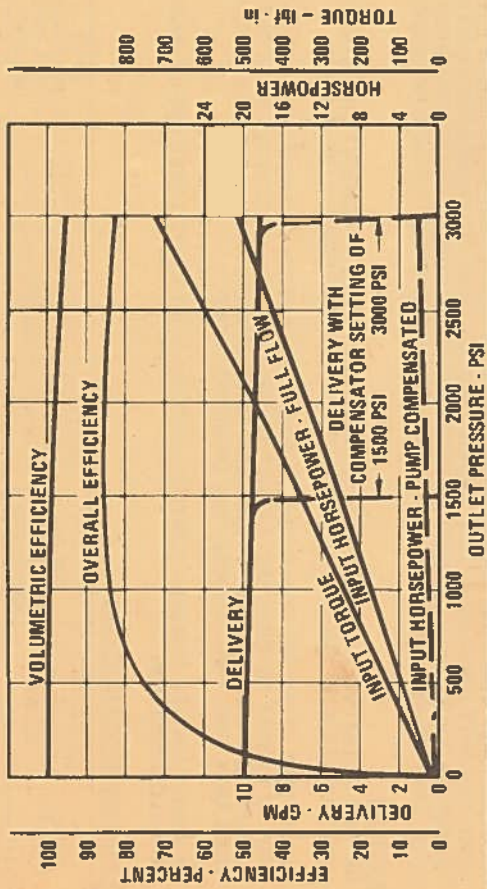


PVB15 SERIES



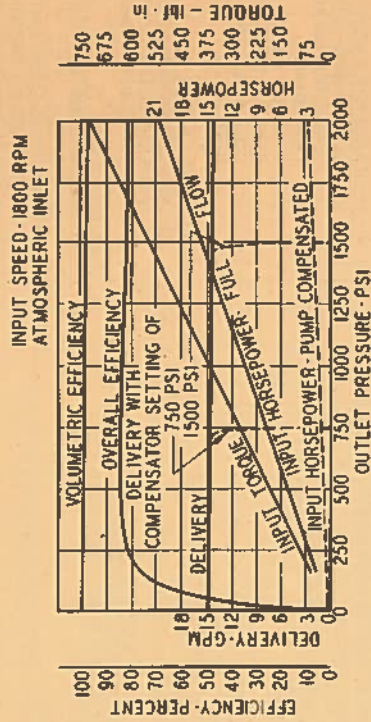
PERFORMANCE CHARACTERISTICS

BASED ON OIL TEMPERATURE OF 120° F (100 SUS)  
1800 RPM INPUT - ATMOSPHERIC INLET



PERFORMANCE CHARACTERISTICS

BASED ON OIL TEMPERATURE OF 120° F (100 SUS)  
1800 RPM INPUT - ATMOSPHERIC INLET



STANDARD GRAPHICAL SYMBOLS FOR FLUID POWER DIAGRAMS



PRESSURE COMPENSATOR



PRESSURE COMPENSATOR WITH MAXIMUM ADJUSTABLE STOP



HANDWHEEL CONTROL

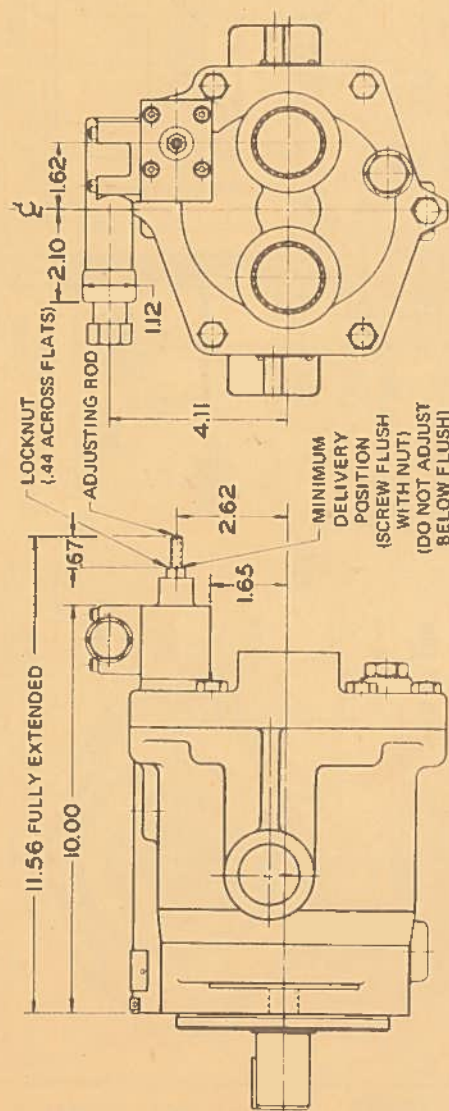


LEVER CONTROL









#### CONTROL DESCRIPTION

THE ADJUSTABLE MAXIMUM STOP PRESSURE CONTROL ENABLES THE MAXIMUM PUMP DELIVERY TO BE EXTERNALLY ADJUSTED FROM 25% TO 100% WHILE MAINTAINING ALL OF THE STANDARD FEATURES OF A PRESSURE COMPENSATED PUMP. TO ASSIST INITIAL PRIMING, MANUAL ADJUSTMENT CONTROL SETTING MUST BE AT LEAST 40 PERCENT OF MAXIMUM FLOW POSITION.

#### CONTROL ADJUSTMENT

LOOSEN LOCKNUT ON ADJUSTING ROD. TURN ADJUSTING ROD CLOCKWISE (CW) TO DECREASE MAXIMUM PUMP DELIVERY OR COUNTERCLOCKWISE (CCW) TO INCREASE MAXIMUM PUMP DELIVERY UNTIL DESIRED SETTING IS OBTAINED. SECURE THIS SETTING BY TIGHTENING LOCKNUT.

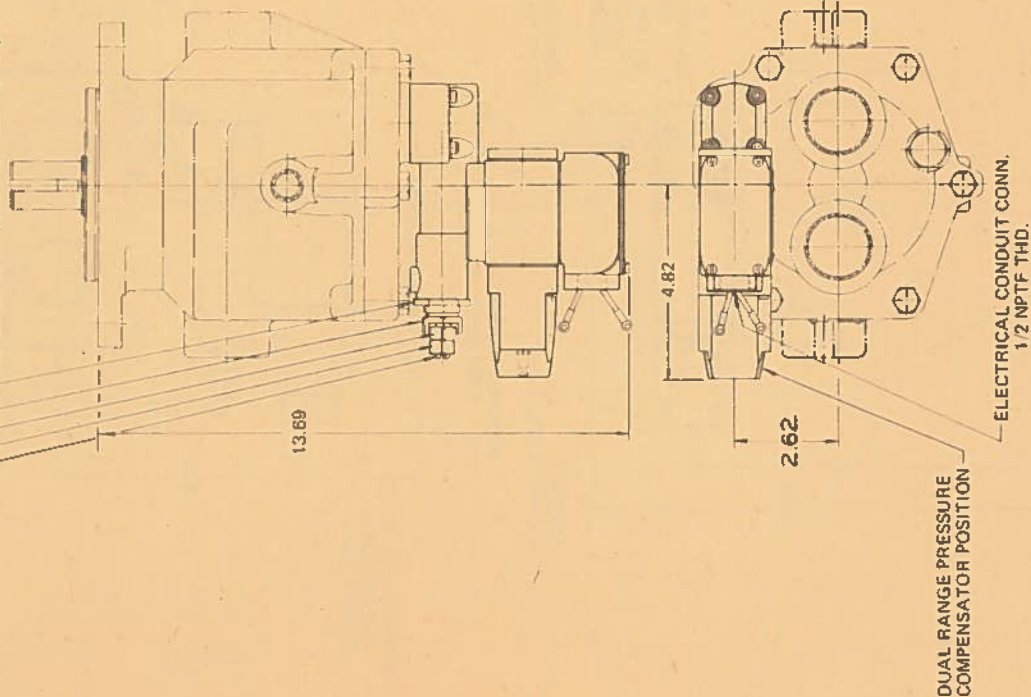
#### NOTE:

THE ADJUSTABLE MAXIMUM STOP IS NOT AVAILABLE ON THE PVB20 AND PVB29 THRU-SHAFT MODELS.

PRESSURE COMPENSATOR CONTROL WITH MANUAL ADJUSTABLE MAXIMUM DISPLACEMENT STOP



1. ADJUSTING SPOOL - SETS SECOND STAGE PRESSURE
2. LOCKNUT - (.68 ACROSS FLATS)
3. LOCKNUT - MUST BE CONTAINED WITHIN SLOT OF ADJUSTING SCREW
4. ADJUSTING SCREW - (1.00 ACROSS FLATS) SETS FIRST STAGE PRESSURE
5. LOCKNUT - (.125 ACROSS FLATS)



**ELECTRIC DUAL-RANGE  
PRESSURE COMPENSATOR CONTROL**

## PVB20 AND PVB29-20 DESIGN VARIABLE DELIVERY INLINE PISTON PUMP WITH DUAL RANGE PRESSURE COMPENSATOR CONTROL

### CONTROL DESCRIPTION

THE DUAL RANGE PRESSURE COMPENSATOR CONTROL AUTOMATICALLY ADJUSTS PUMP DELIVERY TO MAINTAIN VOLUME REQUIREMENTS OF THE SYSTEM AT EITHER OF TWO PRESELECTED OPERATING PRESSURES.

MAXIMUM PUMP DELIVERY IS MAINTAINED TO APPROXIMATELY 50 PSI BELOW EITHER OF THE PRESSURE CONTROL SETTINGS BEFORE BEING REDUCED.

ELECTRIC CONTROL OF THE DUAL RANGE PRESSURE COMPENSATOR IS AVAILABLE IN TWO PRESSURE RANGES OF 250 TO 1500 PSI OR 250 TO 3000 PSI. CONTROL TYPE AND PRESSURE RANGE IS DESIGNATED IN THE MODEL CODE.

### CONTROL FEATURES

THE DUAL RANGE PRESSURE COMPENSATOR OFFERS THE FOLLOWING ADVANTAGES:

1. LOW - PRESSURE SETTING FOR -  
A - LOW HORSEPOWER START-UP  
B - TOOL OR EQUIPMENT TRYOUT  
C - LOW POWER CONSUMPTION AND LOW HEAT GENERATION  
WHEN THE MACHINE OR CIRCUIT IS AT REST
2. HIGH - PRESSURE SETTING FOR -  
A - MACHINING OR CIRCUIT APPLICATIONS

### CONTROL ADJUSTMENT

1. WITH THE DIRECTIONAL VALVE DE-ENERGIZED, LOOSEN LOCKNUT "5" AND TURN THE ADJUSTING SCREW "4" TO THE DESIRED FIRST STAGE PRESSURE SETTING AND TIGHTEN LOCKNUT "5".

2. WITH SOLENOID DE-ENERGIZED, TURN ADJUSTING SPOOL "1" COUNTER-CLOCKWISE (CCW) UNTIL NUT "3" IS BOTTOMED IN ADJUSTING SCREW SLOT. (SECOND STAGE SETTING IS NOW EQUAL TO FIRST STAGE PRESSURE SETTING.) TURN ADJUSTING SPOOL CLOCKWISE (CW) TO DESIRED SECOND STAGE PRESSURE REQUIREMENTS. (ONE COMPLETE TURN OF ADJUSTING SPOOL EQUALS APPROXIMATELY 800 PSI ON "CD" MODELS, AND 300 PSI ON "CMD" MODELS.) ENERGIZE SOLENOID AND CHECK PRESSURE SETTING. DE-ENERGIZE SOLENOID AND RE-ADJUST IF NECESSARY. SECURE THIS SETTING BY TIGHTENING LOCKNUT "2".

NOTE: NOT AVAILABLE WITH THRU SHAFT MODELS.

▲ NOTE: ANY SLIDING SPOOL VALVE, IF HELD SHIFTED UNDER PRESSURE FOR LONG PERIODS OF TIME, MAY STICK AND NOT SPRING RETURN DUE TO FLUID RESIDUE FORMATION AND, THEREFORE, SHOULD BE CYCLED PERIODICALLY TO PREVENT THIS FROM HAPPENING.

▲ SOLENOID DATA (110 V ac 50 Hz AND 115/120 V ac 60 Hz)

SOLENOID CURRENT	INRUSH amps (R.M.S.)	HOLDING amps
115/120 V ac 60 Hz - 110 V ac 50 Hz	2.0	.4

★ MAXIMUM PEAK INRUSH amps APPROXIMATELY 1.4 X R.M.S. VALUE SHOWN.



**PVB20 AND PVB29-20 DESIGN  
VARIABLE DELIVERY INLINE PISTON PUMP WITH DUAL RANGE  
PRESSURE COMPENSATOR CONTROL &  
MAXIMUM FLOW ADJUSTABLE STOP**

**CONTROL DESCRIPTION**

THE DUAL RANGE PRESSURE COMPENSATOR CONTROL WITH MAX. FLOW ADJUSTABLE STOP AUTOMATICALLY ADJUSTS PUMP DELIVERY TO MAINTAIN VOLUME REQUIREMENTS OF THE SYSTEM AT EITHER OF TWO PRE-SELECTED OPERATING PRESSURES.

MAXIMUM PUMP DELIVERY IS MAINTAINED TO APPROXIMATELY 50 PSI BELOW EITHER OF THE PRESSURE CONTROL SETTINGS BEFORE BEING REDUCED. THE MAXIMUM DELIVERY IS ADJUSTABLE AND CAN BE SET AT ANY SETTING FROM 25% TO 100% FLOW.

ELECTRIC CONTROL OF THE DUAL RANGE PRESSURE COMPENSATOR IS AVAILABLE IN TWO PRESSURE RANGES OF 250 TO 1500 PSI OR 250 TO 3000 PSI. CONTROL TYPE AND PRESSURE RANGE IS DESIGNATED IN THE MODEL CODE.

**COMPENSATOR CONTROL**

1. WITH THE DIRECTIONAL VALVE DE-ENERGIZED, LOOSEN LOCKNUT "5" AND TURN THE ADJUSTING SCREW "4" TO THE DESIRED FIRST STAGE PRESSURE SETTING AND TIGHTEN LOCKNUT "5".
2. WITH DIRECTIONAL VALVE DE-ENERGIZED, TURN ADJUSTING SPOOL "1" COUNTERCLOCKWISE UNTIL NUT "3" IS BOTTOMED IN ADJUSTING SCREW SLOT. (SECOND STAGE SETTING IS NOW EQUAL TO FIRST STAGE PRESSURE SETTING.) TURN ADJUSTING SPOOL CLOCKWISE TO DESIRED SECOND STAGE PRESSURE REQUIREMENTS (ONE COMPLETE TURN OF ADJUSTING SPOOL EQUALS APPROXIMATELY 600 PSI ON "CCD" MODELS AND 300 PSI ON "CMCD" MODELS.) ENERGIZE SOLENOID AND CHECK PRESSURE SETTING. DE-ENERGIZE SOLENOID AND RE-ADJUST PRESSURE IF NECESSARY. SECURE THIS SETTING BY TIGHTENING LOCKNUT "2".

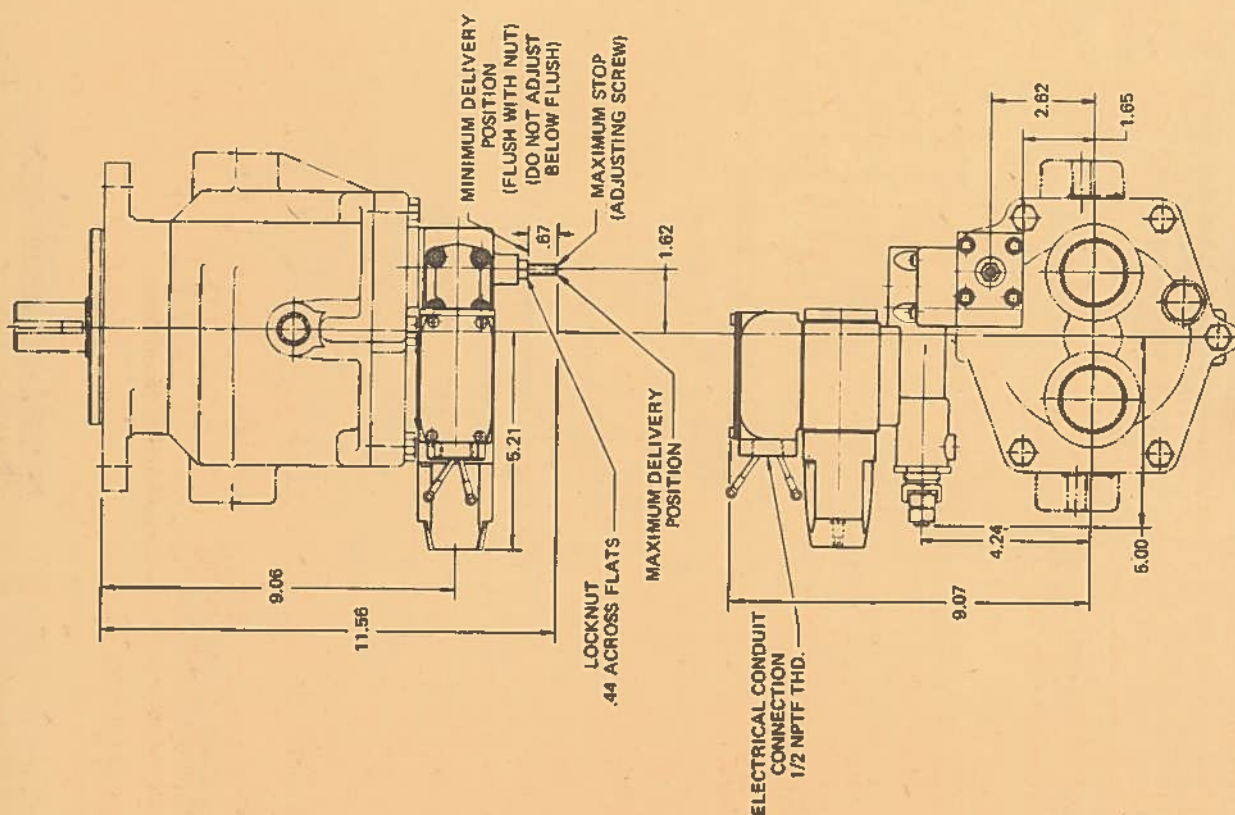
**MAXIMUM FLOW ADJUSTMENT**

WITH THE SYSTEM PRESSURE BELOW BOTH COMPENSATOR SETTINGS, LOOSEN MAXIMUM STOP ADJUSTING SCREW LOCKNUT AND ADJUST SCREW TO DESIRED FLOW POSITION (TURNING SCREW CLOCKWISE DECREASES FLOW AND TURNING SCREW COUNTERCLOCKWISE INCREASES FLOW). TO LOCK SCREW IN POSITION TIGHTEN LOCKNUT. TO ASSIST INITIAL PRIMING ADJUST CONTROL TO AT LEAST 40% OF DISPLACEMENT.

NOTE: THE ADJ. MAX. FLOW STOP IS NOT AVAILABLE ON THE PVB20 & 29 THRU-SHAFT MODELS.

▲ NOTE: ANY SLIDING SPOOL VALVE, IF HELD SHIFTED UNDER PRESSURE FOR LONG PERIODS OF TIME, MAY STICK AND NOT SPRING RETURN DUE TO FLUID RESIDUE FORMATION AND, THEREFORE, SHOULD BE CYCLED PERIODICALLY TO PREVENT THIS FROM HAPPENING.

▲ SOLENOID DATA (SEE NOTE ON PAGE 5085008-2).



**ELECTRIC DUAL-RANGE  
PRESSURE COMPENSATOR  
AND MAXIMUM STOP  
CONTROL**



## GENERAL DATA

THESE UNITS ARE OF THE AXIAL PISTON, VARIABLE DISPLACEMENT, IN-LINE DESIGN. DISPLACEMENT IS VARIED BY MEANS OF A PRESSURE COMPENSATOR, STEM SERVO CONTROL, OR A MANUAL MAXIMUM ADJUSTABLE STOP.

## INSTALLATION INFORMATION

HORIZONTAL MOUNTING IS RECOMMENDED TO MAINTAIN NECESSARY CASE FLUID LEVEL. THE CASE DRAIN LINE MUST BE FULL SIZE UNRESTRICTED AND CONNECTED FROM THE UPPERMOST DRAIN PORT DIRECTLY TO THE RESERVOIR IN SUCH A MANNER THAT THE HOUSING REMAINS FILLED WITH FLUID. PIPING OF DRAIN LINE MUST PREVENT SIPHONING. PIPE DRAIN LINE SO THAT IT TERMINATES BELOW RESERVOIR FLUID LEVEL. NO OTHER LINES ARE TO BE CONNECTED TO THIS DRAIN LINE. CAUTION MUST BE EXERCISED TO NEVER EXCEED 5 PSI UNIT CASE PRESSURE.

## STARTING

BEFORE STARTING, FILL CASE WITH SYSTEM FLUID THRU UPPERMOST DRAIN PORT. HOUSING MUST BE KEPT FULL AT ALL TIMES TO PROVIDE INTERNAL LUBRICATION.

WHEN FIRST STARTING, IT MAY BE NECESSARY TO BLEED AIR FROM PUMP OUTLET LINE TO PERMIT PRIMING AND REDUCE NOISE. BLEED BY LOOSENING AN OUTLET CONNECTION UNTIL SOLID STREAM OF FLUID APPEARS. AN AIRBLEED VALVE IS AVAILABLE FOR THIS PURPOSE. SEE DRAWING 521601.

TO ASSIST INITIAL PRIMING, CONTROL SETTING MUST BE AT LEAST 40% OF MAXIMUM FLOW POSITION.

## OPERATING SPECIFICATIONS

MODEL NUMBER	THEORETICAL DISPLACEMENT IN 3/REV.	DELIVERY GPM AT		MAXIMUM OPERATING SPEED RPM ▲	MAXIMUM PRESSURE PSI	SOUND DATA dB(A)
		1800 RPM	MAX. RPM			
PVB20	2.61	20	26	2400	3000	85
PVB29	3.76	29	38	2400	2000	81

▲ REFER TO PUMP INLET CURVE ON REVERSE SIDE.

■ STRAIGHT PORT MODELS: FULL STROKE, 1800 RPM, MAXIMUM PRESSURE, SAE 10W OIL AT 120° F., 5" Hg INLET VACUUM PER NFPA STANDARD T3.9.70.12.

FILTRATION PRESSURE OR RETURN LINE..... 35 MICRON ABSOLUTE OR LESS INLET..... 149 MICRONS

DRIVE ROTATION SHAFT ROTATION IS NOT REVERSIBLE AND MUST BE SPECIFIED WHEN ORDERING.

FLUIDS CLEAN PETROLEUM ANTIWEAR INDUSTRIAL HYDRAULIC OIL OR AUTOMOTIVE CRANKCASE OIL DESIGNATED SC, SD OR SE. RUNNING VISCOSITY RANGE 70-250 SUS. OPERATING TEMPERATURE 120° F. RECOMMENDED. 150° F. USUAL MAXIMUM. REFER TO DATA SHEET 1-286-S FOR HYDRAULIC FLUID AND TEMPERATURE RECOMMENDATIONS. ALSO SEE FLUID LIFE CHART 507000.

WEIGHT LBS. (APPROX.) FLANGE MTG..... 57 FOOT MTG..... 69

THESE UNITS ARE DESIGNED TO MEET SPECIFICATIONS AS OUTLINED. TO INSURE MAXIMUM UNIT PERFORMANCE, IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION, CONSULT YOUR SPERRY VICKERS APPLICATION ENGINEER IF YOUR:

OIL VISCOSITY AT START-UP IS IN EXCESS OF 600 SSU (HIGHER VISCOSITIES MAY BE USED WITH PROPER INLET CONDITIONS.)

APPLICATION REQUIRES AN INDIRECT DRIVE

MOUNTING ATTITUDE IS OTHER THAN HORIZONTAL

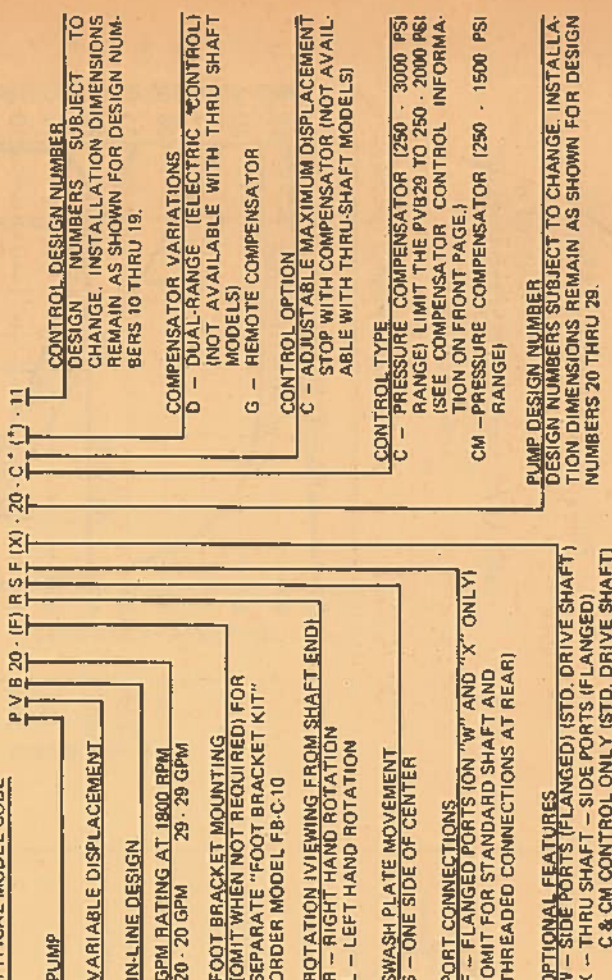
NEEDS REQUIRE APPLICATION ASSISTANCE

## RELIEF VALVE DATA

MINIMUM CIRCUIT VOLUME (CU. IN.) BELOW WHICH RELIEF VALVE IS RECOMMENDED AT COMPENSATOR PRESSURE SHOWN. ●				
PUMP SIZE	DRIVE SPEED	1000 PSI	2000 PSI	3000 PSI
20	1200	100	200	300
	1800	200	300	400
29	1200	200	300	—
	1800	300	400	—

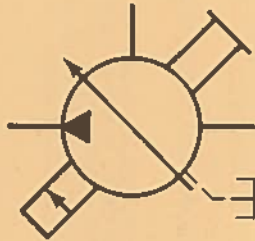
● VALUES MAY BE REDUCED BY 100 IF A 51 DESIGN DG VALVE IS USED.

## TYPICAL MODEL CODE

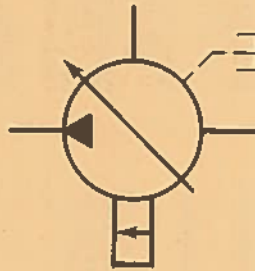




# STANDARD GRAPHICAL SYMBOLS FOR FLUID POWER DIAGRAMS



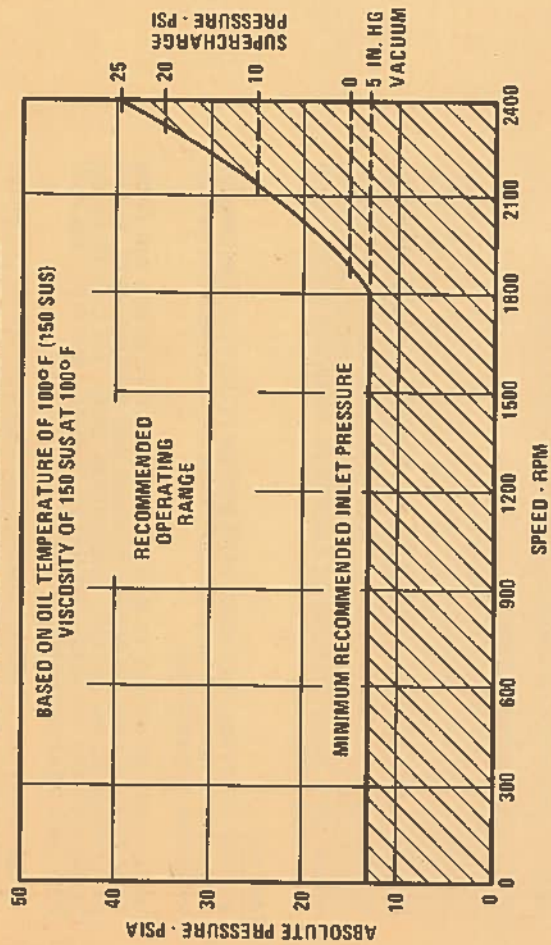
PRESSURE COMPENSATOR  
WITH MAXIMUM  
ADJUSTABLE STOP



PRESSURE COMPENSATOR

## INLET PRESSURE CURVE

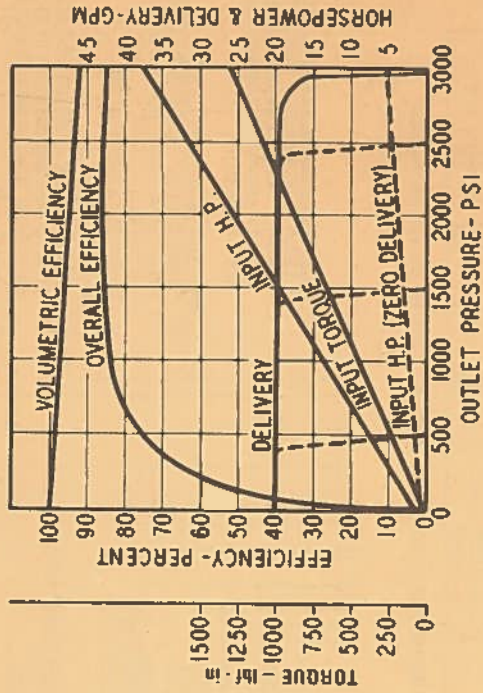
INLET PRESSURE REQUIREMENT VERSUS PUMP SPEED



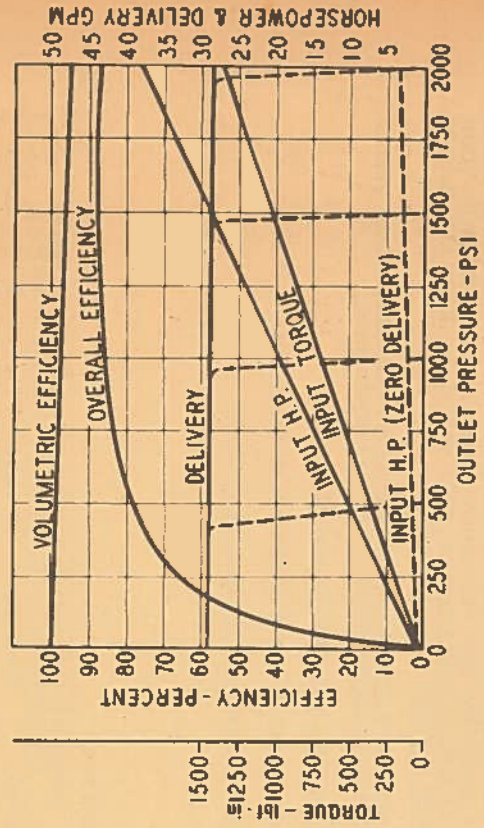
## PERFORMANCE CHARACTERISTICS

BASED ON OIL TEMPERATURE OF 120°F (100 SUS)  
INPUT SPEED 1800 RPM  
ATMOSPHERIC INLET

MODEL PVB20 PUMP



MODEL PVB29 PUMP





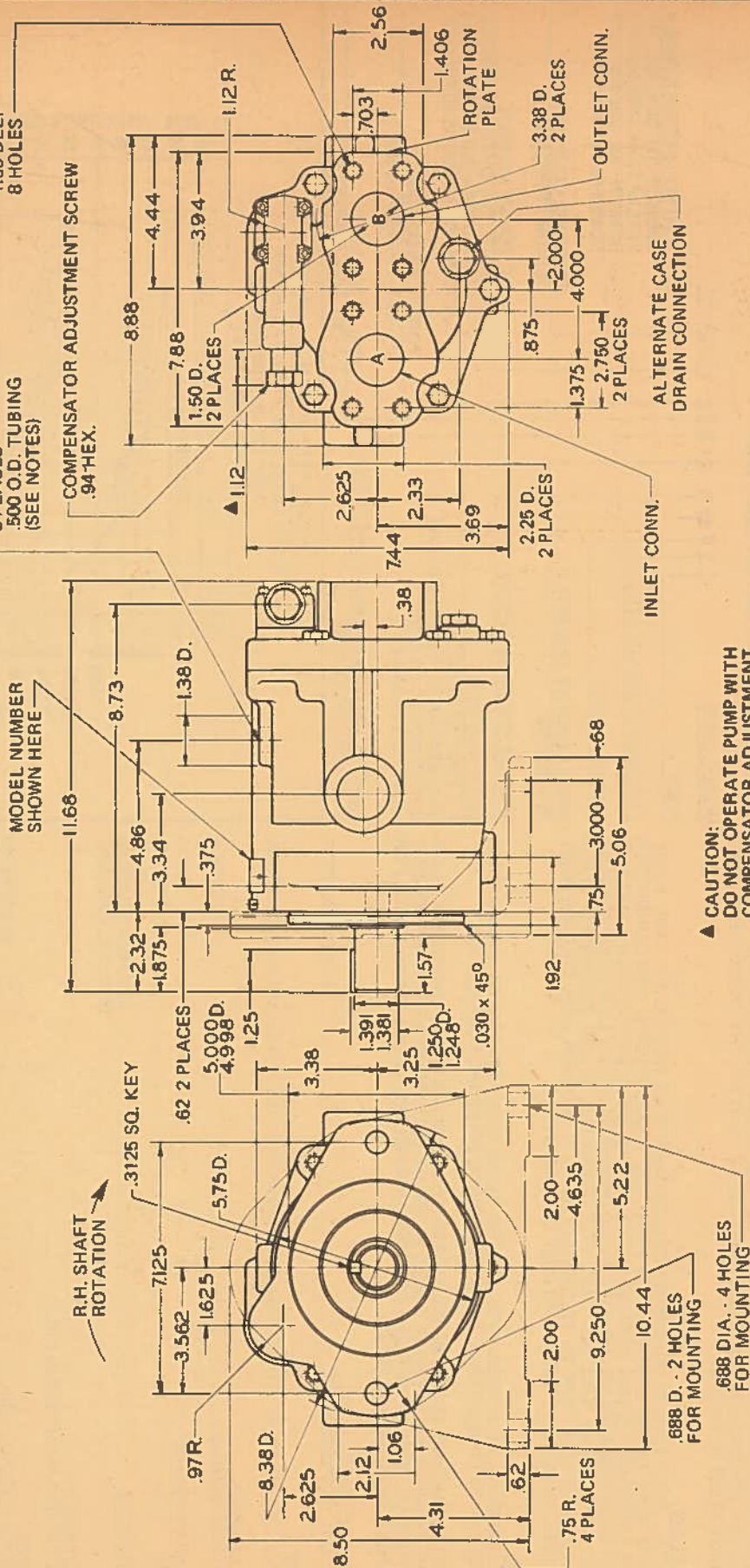
# SPERRY VICKERS

SPERRY VICKERS  
T.M.

## VARIABLE DISPLACEMENT PISTON PUMPS

PVB45A (INLINE TYPE)  
WITH PRESSURE COMPENSATOR CONTROL

THIS PUMP REQUIRES  
A RELIEF VALVE.



CAUTION:  
DO NOT OPERATE PUMP WITH  
COMPENSATOR ADJUSTMENT  
SCREW OUT BEYOND DIM.  
ENSION SHOWN.

NOTE: WHEN ORDERING PUMP MOUNTED 180° FROM  
STANDARD ON FOOT ADD SUFFIX "S15" TO MODEL  
NUMBER.

REVISED 6-1-77

508880

SEC.  
C

SPERRY VICKERS  
TROY, MICHIGAN 48084

PISTON PUMP  
INLINE  
TYPE

VARIABLE  
DISPLACEMENT

PRESSURE  
COMPENSATOR  
CONTROL

45 GPM  
1000 PSI

FLANGE OR  
FOOT  
MOUNTING

DWG. NO.  
508880



**GENERAL DATA**  
THIS UNIT IS OF THE AXIAL PISTON, VARIABLE DISPLACEMENT, INLINE DESIGN. DIS-  
PLACEMENT IS VARIED BY MEANS OF A PRESSURE COMPENSATOR CONTROL.

**PRESSURE COMPENSATOR CONTROL**  
THE PRESSURE COMPENSATOR CONTROL AUTOMATICALLY ADJUSTS PUMP DELIVERY  
TO MAINTAIN VOLUME REQUIREMENTS OF THE SYSTEM AT A PRESELECTED OPERATING  
PRESSURE. MAXIMUM PUMP DELIVERY IS MAINTAINED TO APPROXIMATELY 50 PSI  
BELOW THE PRESSURE CONTROL SETTING BEFORE BEING REDUCED. THE PRESSURE  
COMPENSATOR CONTROL OPERATES ON ONE SIDE OF CENTER. THE PRESSURE ADJUST-  
MENT RANGE IS 200 TO 1000 PSI.

**INSTALLATION**  
**HORIZONTAL MOUNTING** IS RECOMMENDED TO MAINTAIN NECESSARY CASE FLUID  
LEVEL. THE CASE DRAIN LINE MUST BE FULL SIZE UNRESTRICTED AND CONNECTED  
FROM THE UPPERMOST DRAIN PORT DIRECTLY TO THE RESERVOIR IN SUCH A MANNER  
THAT THE CASE REMAINS FILLED WITH FLUID. PIPING OF DRAIN LINE MUST PREVENT  
SIPHONING. PIPE DRAIN LINE SO THAT IT TERMINATES BELOW RESERVOIR FLUID  
LEVEL. NO OTHER LINES ARE TO BE CONNECTED TO THIS DRAIN LINE. CAUTION MUST  
BE EXERCISED TO NEVER EXCEED 5 PSI UNIT CASE PRESSURE.

**STARTING**  
BEFORE STARTING, FILL CASE WITH SYSTEM FLUID THRU UPPERMOST DRAIN PORT.  
CASE MUST BE KEPT FULL AT ALL TIMES TO PROVIDE INTERNAL LUBRICATION.

WHEN FIRST STARTING, IT MAY BE NECESSARY TO BLEED AIR FROM PUMP OUTLET LINE  
TO PERMIT PRIMING AND REDUCE NOISE. BLEED BY LOOSENING AN OUTLET CONNEC-  
TION UNTIL SOLID STREAM OF FLUID APPEARS. AN AIRBLEED VALVE IS AVAILABLE FOR  
THIS PURPOSE. SEE DRAWING 521607.

**OPERATING SPECIFICATIONS**  
THEORETICAL DISPLACEMENT..... 5.72 CU. IN./REV.

**DELIVERY**  
SEE CURVE. DELIVERY AT OTHER SPEEDS IS APPROXIMATELY PROPORTIONAL TO RPM.

**OPERATING SPEED**  
RATED AND MAXIMUM..... 1800 RPM

**OPERATING PRESSURE**  
MAXIMUM..... 1000 PSI

**INLET PRESSURE**  
..... 12.2 PSIA MINIMUM  
(5 IN. HG. VACUUM)

**DRIVE ROTATION**  
SHAFT ROTATION, RIGHT HAND ONLY.

**FILTRATION**  
PRESSURE OR RETURN LINE..... 25 MICRONS  
INLET..... 149 MICRONS

**FLUIDS**  
CLEAN PETROLEUM ANTIWEAR INDUSTRIAL HYDRAULIC OIL OR AUTOMOTIVE CRANK-  
CASE OIL DESIGNATED SC, SD OR SE RUNNING VISCOSITY RANGE 70-250 SUS. OPERATING  
TEMPERATURE 120° F RECOMMENDED, 150° F USUAL MAXIMUM. REFER TO DATA SHEET  
I-288-S FOR HYDRAULIC FLUID AND TEMPERATURE RECOMMENDATIONS.

**FLANGES**  
BOTH INLET AND OUTLET PORTS ACCEPT SPERRY VICKERS FL 1-12-12P-10 OR FL 1-12-12W-10  
SAE 4-BOLT FLANGES; DATA ON DRAWING I-250700.

**WEIGHT LBS. (APPROX.)**  
FLANGE MOUNT..... 61  
FOOT MOUNT..... 73

THESE UNITS ARE DESIGNED TO MEET SPECIFICATIONS AS OUTLINED. TO INSURE  
MAXIMUM UNIT PERFORMANCE IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION,  
CONSULT YOUR SPERRY VICKERS APPLICATION ENGINEER IF YOUR:

FLUID DOES NOT MEET THE SPECIFICATIONS SHOWN ON DATA SHEET I-288-S  
APPLICATION REQUIRES AN INDIRECT DRIVE  
MOUNTING ATTITUDE IS OTHER THAN HORIZONTAL  
NEEDS REQUIRE APPLICATION ASSISTANCE

MODEL CODE PVB 45A (E) RSF-10-CA-11

PUMP

VARIABLE DISPLACEMENT

INLINE PISTON

GPM RATING AT 1800 RPM  
45 - 45 GPM

MEDIUM PRESSURE DESIGN

MOUNTING TYPE  
F - FOOT BRACKET  
(FOR SEPARATE "FOOT BRACKET KIT"  
ORDER MODEL FB-C-10)  
(OMIT FOR FLANGE)

CONTROL-DESIGN NUMBER  
SUBJECT TO CHANGE. IN-  
STALLATION DIMENSIONS  
REMAIN AS SHOWN FOR  
NUMBERS 10 THRU 19.

PRESSURE COMPENSATOR  
MEDIUM PRESSURE

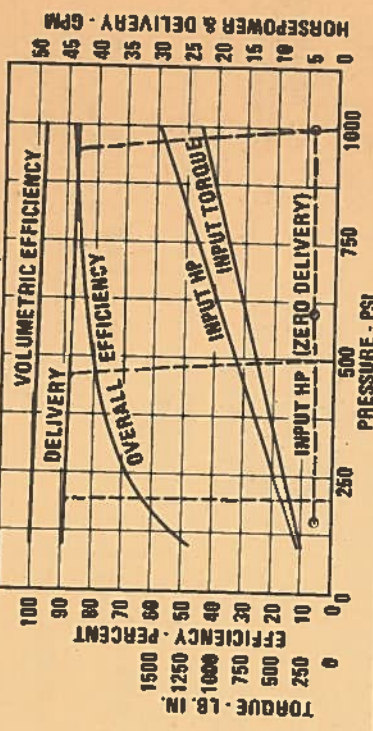
PUMP-DESIGN NUMBER  
SUBJECT TO CHANGE. INSTAL-  
LATION DIMENSIONS REMAIN AS  
SHOWN FOR NUMBERS 10 THRU 19.

PORT CONNECTIONS  
F - SAE 4 BOLT FLANGE

DISPLACEMENT  
S - ONE SIDE OF CENTER

SHAFT ROTATION (VIEWING SHAFT END)  
R - RIGHT HAND (CW)

TYPICAL PERFORMANCE CURVES  
BASED ON OIL TEMP. OF 120° F. (100 SSU)  
INPUT SPEED - 1800 RPM  
ATMOSPHERIC INLET



STANDARD GRAPHICAL SYMBOL  
FOR FLUID POWER DIAGRAMS



**SPERRY-VICKERS**  
TROY, MICHIGAN 48064

PISTON PUMP  
IN-LINE TYPE

VARIABLE  
DISPLACEMENT

PRESSURE  
COMPENSATOR  
CONTROL

45 GPM  
3000 PSI  
OUTLET

INTEGRAL  
FOOT OR FLANGE  
MOUNTING

DWG. NO.  
508890

**SPERRY-VICKERS**  
T.M.

# **VARIABLE DISPLACEMENT PISTON PUMPS**

PVB45-20 DESIGN (IN-LINE TYPE)  
WITH PRESSURE COMPENSATOR CONTROL

COMPENSATOR ADJUSTMENT SCREW

CAUTION - WHILE PUMP IS OPERATING DO NOT  
BACK COMPENSATOR ADJUSTMENT SCREW  
OUT BEYOND DIMENSION SHOWN

.375-16 UNC - 28 THD.  
.47 DEEP FOR EYE BOLT

CASE DRAIN CONNECTION  
1.062-12 UNC-28 THD.  
S.A.E. STRAIGHT THD. FOR  
.750 O.D. TUBING - 2 PLACES  
(SEE NOTES)

.437 SQUARE KEY

1.50 HEX.  
.50 R.  
4 PLACES

1.945  
1.935  
1.500

1.750 D  
1.748

4.342

5.72

2.72

2.625

7.00

7.16

15.35

16.00

7.21

1.38

MODEL NUMBER  
SHOWN HERE

DIRECTION OF ROTATION  
SHOWN HERE

500-13 UNC-28 THD.  
1.06 DEEP  
8 HOLES

OUTLET CONNECTION  
FOR L.H. ROTATION MODELS  
2.00 D. (REF.) (USE SAE 4  
BOLT FLANGE)

OUTLET CONNECTION  
FOR R.H. ROTATION MODELS  
2.00 D. (REF.) (USE SAE 4  
BOLT FLANGE)

11.60

11.62

3.062

1.531

2.44

2.500

5.000

5.562

1.688

11.125

6.94

13.88

2.44

1.93 R.

5.88

11.76

1.50

1.50

1.50

1.50

1.50

1.50

1.50

1.50

1.50

1.50

1.50

1.50

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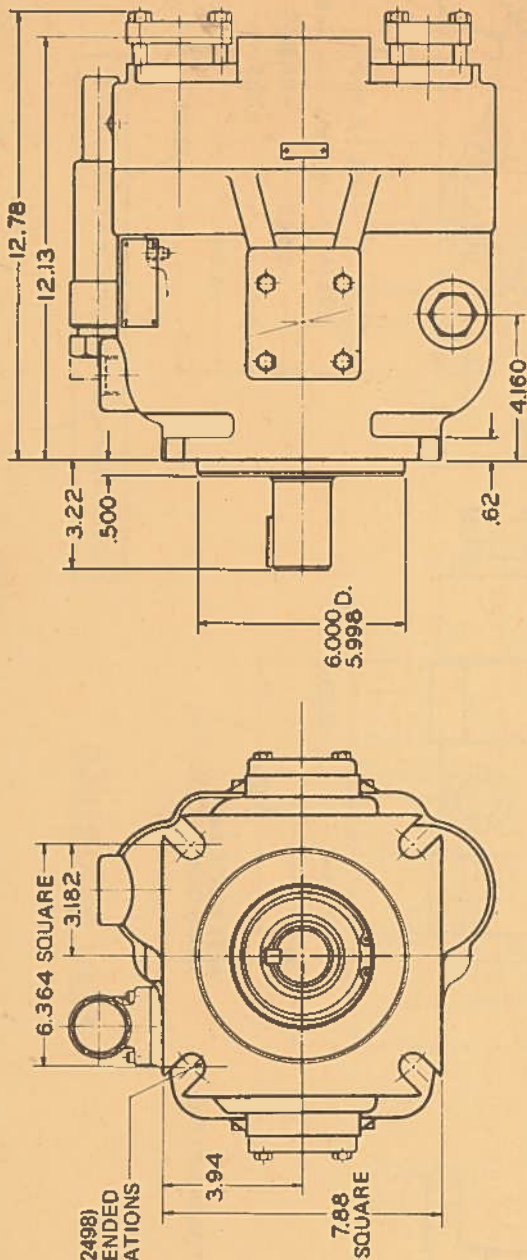
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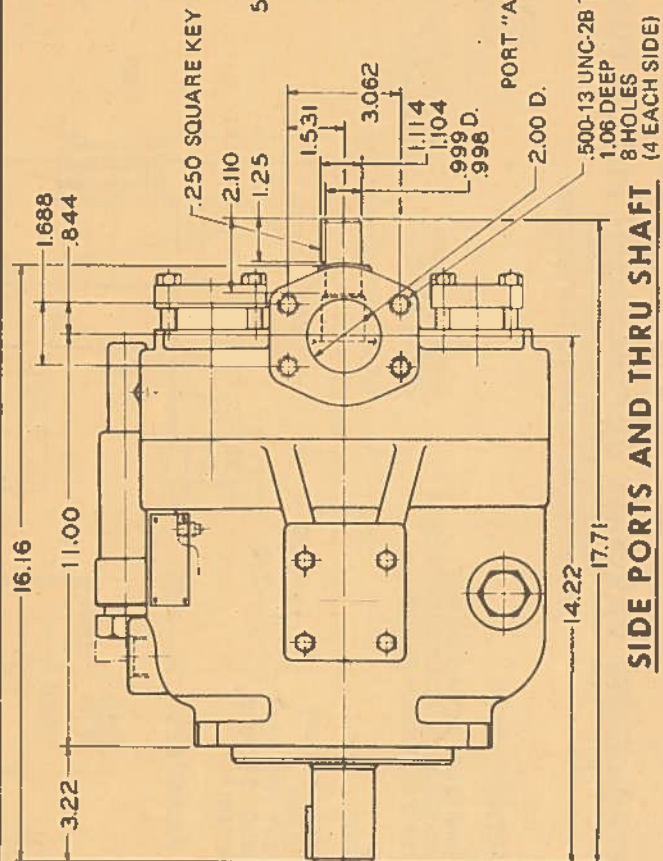
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### FLANGE MOUNTING

NOTE: SEE PAGE 508890 FOR INSTALLATION INFORMATION NOT SHOWN.



### SIDE PORTS AND THRU SHAFT

AVAILABLE WITH INTEGRAL FOOT OR FLANGE MOUNTING

#### DRIVE LIMITATIONS (THRU SHAFTS)

LARGE SHAFT END			
MAX. INPUT TORQUE (IN.-LB)	INPUT HP @ 1800 R.P.M.	INPUT HP @ 1200 R.P.M.	
3160	90	60	

SMALL SHAFT END			
MAX. INPUT TORQUE (IN.-LB)	INPUT HP @ 1800 R.P.M.	INPUT HP @ 1200 R.P.M.	
1580	45	30	





## VARIABLE DISPLACEMENT PISTON PUMPS

PVB45-20 DESIGN (IN-LINE TYPE)  
WITH PRESSURE COMPENSATOR CONTROL

### GENERAL DATA

THIS UNIT IS OF THE AXIAL PISTON, VARIABLE DISPLACEMENT, IN-LINE DESIGN. DISPLACEMENT IS VARIED BY MEANS OF A PRESSURE COMPENSATOR CONTROL.

### PRESSURE COMPENSATOR CONTROL

THE PRESSURE COMPENSATOR CONTROL AUTOMATICALLY ADJUSTS PUMP DELIVERY TO MAINTAIN VOLUME REQUIREMENTS OF THE SYSTEM AT A PRESELECTED OPERATING PRESSURE. MAXIMUM PUMP DELIVERY IS MAINTAINED TO APPROXIMATELY 200 PSI BELOW THE PRESSURE CONTROL SETTING BEFORE BEING REDUCED. THE PRESSURE COMPENSATOR CONTROL OPERATES ON ONE SIDE OF CENTER. TWO PRESSURE ADJUSTMENT RANGES 150-1500 AND 250-3000 PSI ARE AVAILABLE.

### INSTALLATION

HORIZONTAL MOUNTING IS RECOMMENDED TO MAINTAIN NECESSARY CASE FLUID LEVEL. THE CASE DRAIN LINE MUST BE FULL SIZE UNRESTRICTED AND CONNECTED FROM THE UPPERMOST DRAIN PORT DIRECTLY TO THE RESERVOIR IN SUCH A MANNER THAT THE CASE REMAINS FILLED WITH FLUID. PIPING OF DRAIN LINE MUST PREVENT SIPHONING. PIPE DRAIN LINE SO THAT IT TERMINATES BELOW RESERVOIR FLUID LEVEL. NO OTHER LINES ARE TO BE CONNECTED TO THIS DRAIN LINE. CAUTION MUST BE EXERCISED TO NEVER EXCEED 5 PSI UNIT CASE PRESSURE.

### STARTING

BEFORE STARTING, FILL CASE WITH SYSTEM FLUID THRU UPPERMOST DRAIN PORT. CASE MUST BE KEPT FULL AT ALL TIMES TO PROVIDE INTERNAL LUBRICATION.

WHEN FIRST STARTING, IT MAY BE NECESSARY TO BLEED AIR FROM PUMP OUTLET LINE TO PERMIT PRIMING AND REDUCE NOISE. BLEED BY LOOSENING AN OUTLET CONNECTION UNTIL SOLID STREAM OF FLUID APPEARS. AN AIRBLEED VALVE IS AVAILABLE FOR THIS PURPOSE. SEE DRAWING 521601.

### OPERATING SPECIFICATIONS

THEORETICAL DISPLACEMENT..... 5.76 CU. IN./REV.

DELIVERY..... SEE CURVE

### OPERATING SPEED

RATED..... 1800 RPM  
MAXIMUM..... 2200 RPM

### OPERATING PRESSURE

MAXIMUM..... 3000 PSI

INLET PRESSURE..... SEE CURVE

### DRIVE ROTATION

SHAFT ROTATION IS NOT REVERSIBLE AND MUST BE SPECIFIED WHEN ORDERING (SEE MODEL CODE).

### FILTRATION

PRESSURE OR RETURN LINE..... 25 MICRONS  
INLET..... 149 MICRONS

### FLUIDS

REFER TO DATA SHEET I-286-S (SECTION L) FOR HYDRAULIC OIL REQUIREMENTS.

### FLANGES

BOTH INLET AND OUTLET PORTS ACCEPT VICKERS' FL1-16-16P-10 OR FL1-16-16W-10 SAE 4-BOLT FLANGES; DATA ON DRAWING I-250700.

### WEIGHT (APPROXIMATE)

210 LBS.

THESE UNITS ARE DESIGNED TO MEET SPECIFICATIONS AS OUTLINED. TO INSURE MAXIMUM UNIT PERFORMANCE IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION, CONSULT YOUR VICKERS APPLICATION ENGINEER IF YOUR:

SPEED IS ABOVE 1800 RPM

FLUID DOES NOT MEET THE SPECIFICATIONS SHOWN ON DATA SHEET I-286-S

OIL VISCOSITY AT START-UP IS IN EXCESS OF 600 SSU

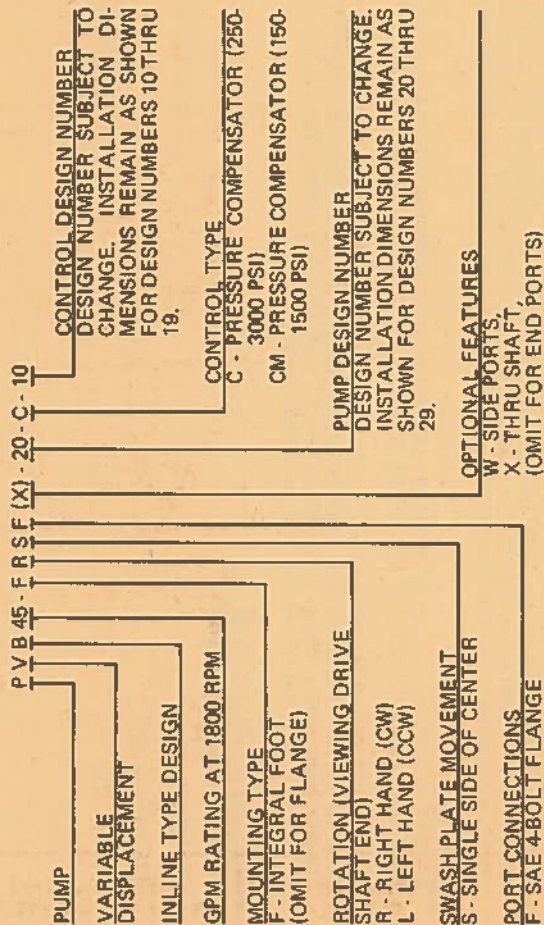
APPLICATION REQUIRES AN INDIRECT DRIVE

MOUNTING ATTITUDE IS OTHER THAN HORIZONTAL

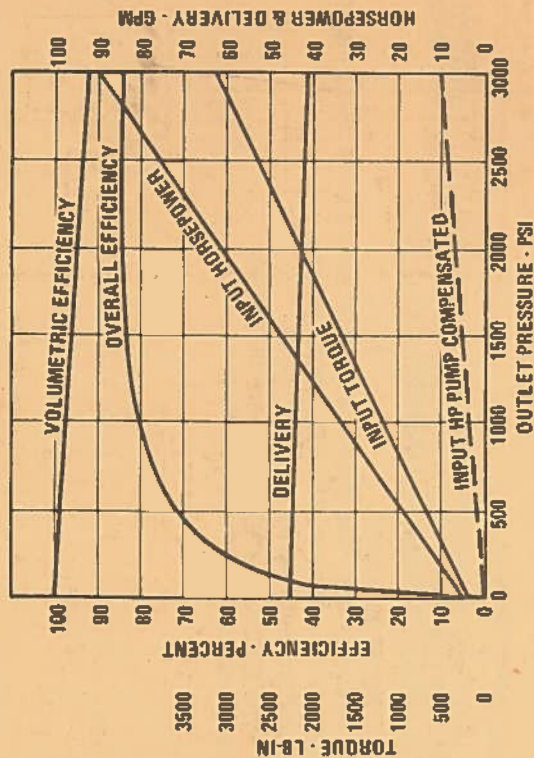
NEEDS REQUIRE APPLICATION ASSISTANCE



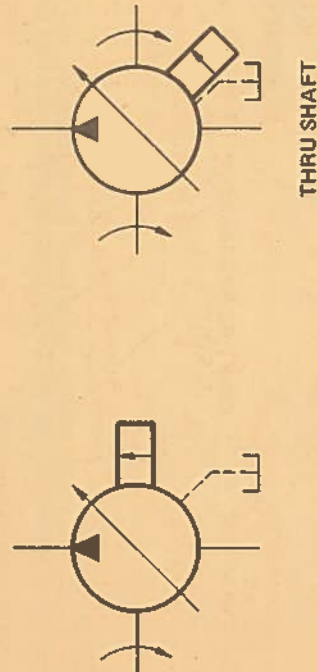
# MODEL CODE



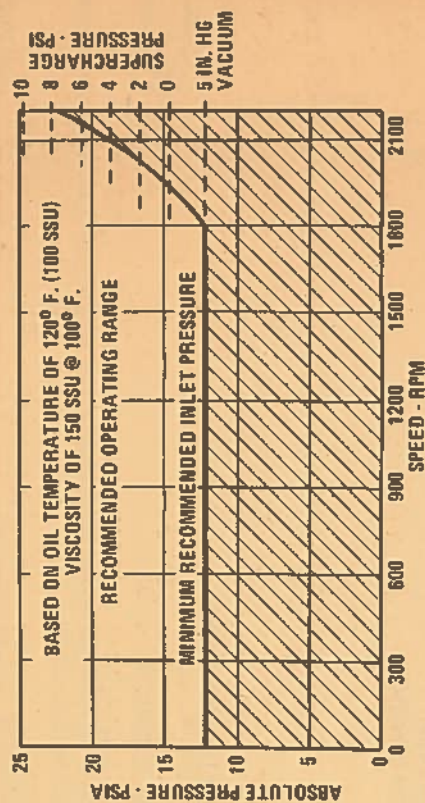
## PERFORMANCE CURVES INPUT SPEED - 1800 RPM ATMOSPHERIC INLET



## STANDARD GRAPHICAL SYMBOLS FOR FLUID POWER DIAGRAMS



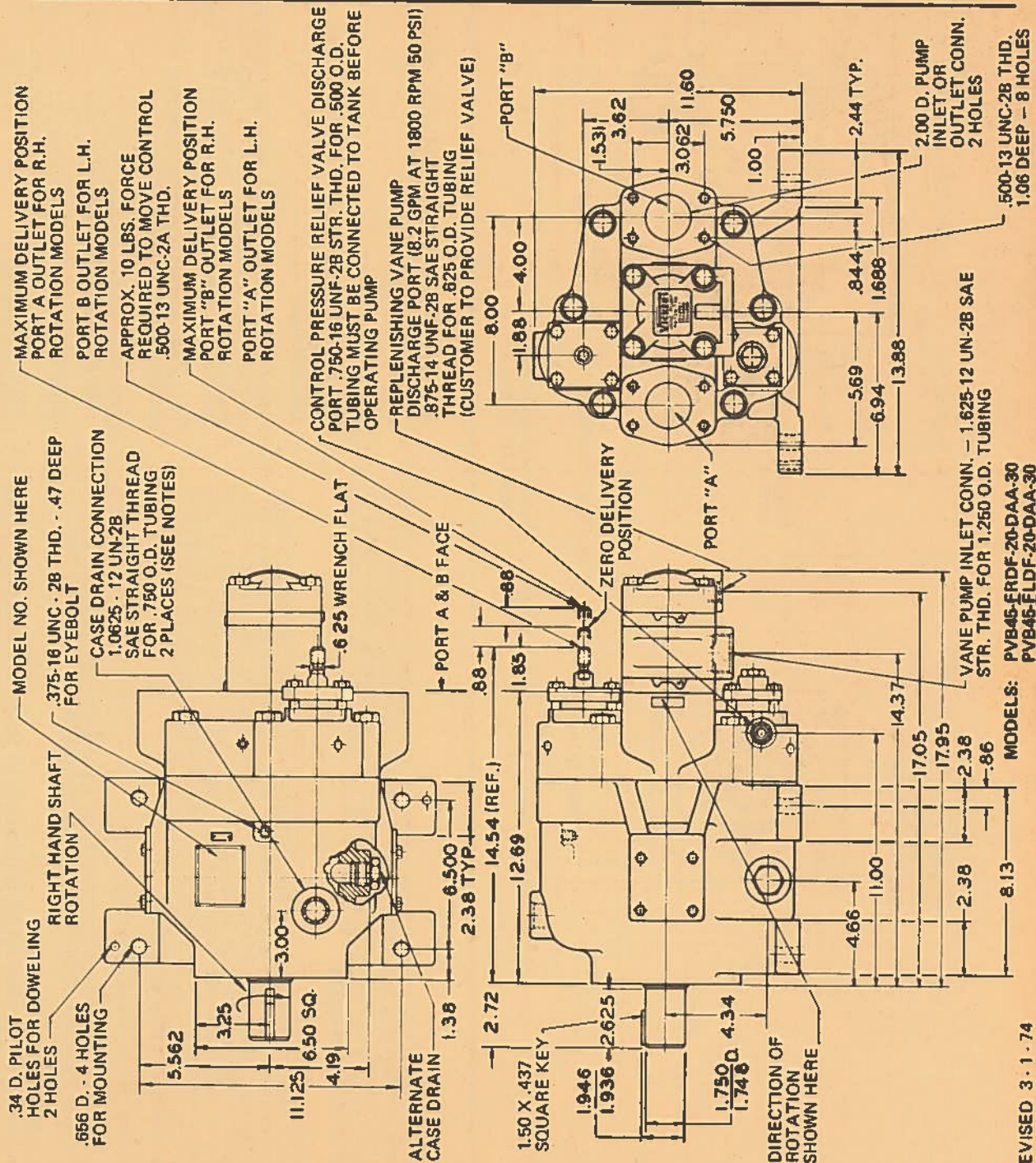
## INLET PRESSURE REQUIREMENTS VERSUS PUMP SPEED





# **SPERRY VICKERS** **VARIABLE DISPLACEMENT INLINE PISTON PUMP**

MODEL SERIES PVB45-<sup>+</sup>DF-20-D-<sup>+</sup>30  
 STEM SERVO CONTROL  
 INTEGRAL FOOT OR FLANGE MOUNTING



REVISED 3-1-74

**SPERRY VICKERS**  
 TROY, MICHIGAN 48064

**VARIABLE DISPLACEMENT PISTON PUMP**

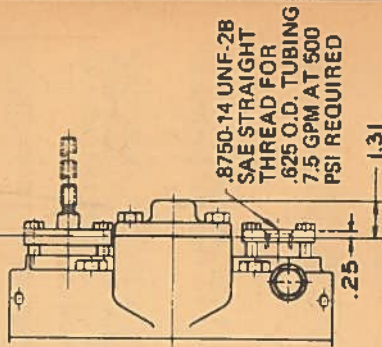
**45 GPM AT 3000 PSI**

**STEM SERVO CONTROL**

**INTEGRAL FOOT OR FLANGE MOUNTING**

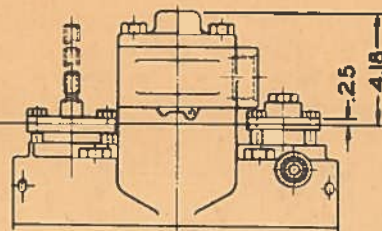
**DWG. NO. 509005**

12.69 (REF.) TO END OF HOUSING



**MODELS: PVB45-<sup>+</sup>RDF-20-D-30 PVB45-<sup>+</sup>LDF-20-D-30**

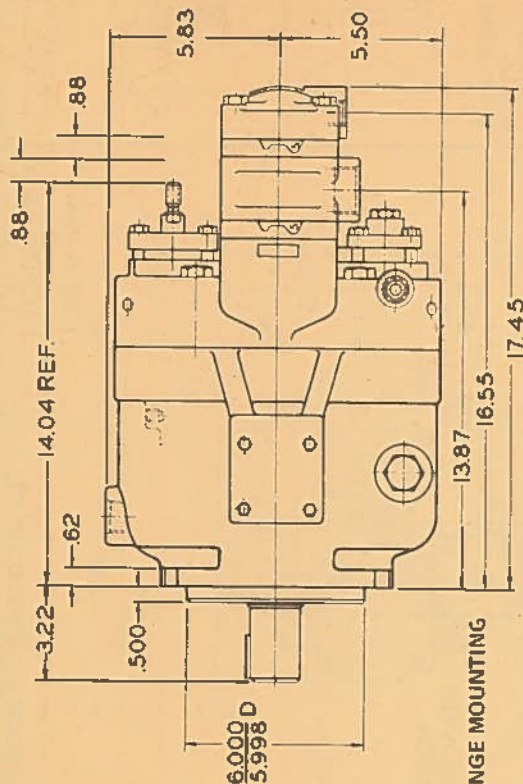
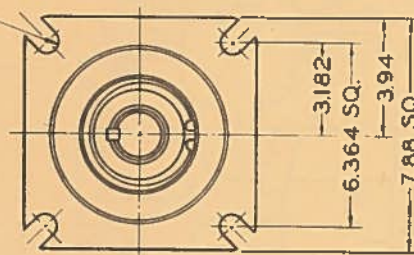
12.69 (REF.) TO END OF HOUSING



**MODELS: PVB45-<sup>+</sup>RDF-20-DA-30 PVB45-<sup>+</sup>LDF-20-DA-30**



.390 R. 4 SLOTS  
3/4-10 UNC X 1-1/2 HEX SCREW  
(212498) & WASHER (233118)  
RECOMMENDED FOR FLANGE  
MOUNT APPLICATIONS.



FLANGE MOUNTING

MODELS: PVB45-RDF-20-DAA-30  
PVB45-LDF-20-DAA-30

## GENERAL DATA

THIS UNIT IS OF THE AXIAL PISTON, VARIABLE DISPLACEMENT, INLINE DESIGN RATED AT 1800 RPM AND 1500 PSI. DISPLACEMENT IS CONTROLLED BY A STEM SERVO CONTROL WHICH OPERATES BOTH SIDES OF CENTER PERMITTING BI-DIRECTIONAL FLOW CHARACTERISTICS. SHAFT ROTATION IS AS TABULATED AND IS NOT REVERSIBLE.

## STEM SERVO CONTROL

USE OF THE STEM SERVO CONTROL PROVIDES ACCURATE CONTROL OF FLOW AND EXTREMELY SMOOTH FLOW REVERSAL WHILE ELIMINATING THE NEED FOR EXTERNAL FLOW, DECELERATION, AND DIRECTIONAL VALVES. THIS CONTROL PROVIDES MECHANICAL OR MANUAL SELECTION OF PUMP DELIVERY FROM ZERO TO MAXIMUM. THE STEM MAY BE MOVED .88 OF AN INCH ON EACH SIDE OF CENTER POSITION TO PERMIT FULL REVERSAL OF FLOW. DELIVERY RATE CHANGES LINEARLY WITH STEM POSITION. TOTAL STEM TRAVEL IS LIMITED TO 1.76 INCHES BY INTERNAL STOPS.

MINIMUM RECOMMENDED STROKING TIME..... .25 SECONDS

IF AUXILIARY PUMP IS NOT USED, PROVIDE 7.5 GPM AT 500 PSI PRESSURE CONTROL POWER SOURCE TO OBTAIN MINIMUM RECOMMENDED STROKING TIME.

## INSTALLATION INFORMATION

HORIZONTAL MOUNTING IS RECOMMENDED TO MAINTAIN NECESSARY CASE FLUID LEVEL. THE CASE DRAIN LINE MUST BE FULL SIZE UNRESTRICTED AND CONNECTED FROM THE UPPERMOST DRAIN PORT DIRECTLY TO THE RESERVOIR IN SUCH A MANNER THAT THE HOUSING REMAINS FILLED WITH FLUID. PIPING OF DRAIN LINE MUST PREVENT SIPHONING. PIPE DRAIN LINE SO THAT IT TERMINATES BELOW RESERVOIR FLUID LEVEL. NO OTHER LINES ARE TO BE CONNECTED TO THIS DRAIN LINE. CAUTION MUST BE EXERCISED TO NEVER EXCEED 5 PSI UNIT CASE PRESSURE.

## STARTING

BEFORE STARTING, FILL CASE WITH SYSTEM FLUID THRU UPPERMOST DRAIN PORT. HOUSING MUST BE KEPT FULL AT ALL TIMES TO PROVIDE INTERNAL LUBRICATION.

WHEN FIRST STARTING, IT MAY BE NECESSARY TO BLEED AIR FROM PUMP OUTLET LINE TO PERMIT PRIMING AND REDUCE NOISE. BLEED BY LOOSENING AN OUTLET CONNECTION UNTIL SOLID STREAM OF FLUID APPEARS. AN AIR-BLEED VALVE IS AVAILABLE FOR THIS PURPOSE. SEE DRAWING 521601.

TO ASSIST INITIAL PRIMING, CONTROL SETTING MUST BE AT LEAST 40% OF MAXIMUM FLOW POSITION.

## OPERATING SPECIFICATIONS

THEORETICAL DISPLACEMENT..... 5.76 CU. IN./REV.

DELIVERY..... SEE CURVE

## OPERATING SPEED

RATED..... 1800 RPM  
MAXIMUM..... 2200 RPM



# OPERATING PRESSURE

MAXIMUM..... 3000 PSI

# INLET PRESSURE (MINIMUM)

..... 50 PSI

# DRIVE ROTATION

SHAFT ROTATION IS NOT REVERSIBLE AND MUST BE SPECIFIED WHEN ORDERING.

# FILTRATION

PRESSURE OR RETURN LINE..... 25 MICRONS  
INLET..... 149 MICRONS

# FLUIDS

FOR HYDRAULIC OIL REQUIREMENTS REFER TO DATA SHEET I-286-S.

# FLANGES

BOTH INLET AND OUTLET PORTS ACCEPT VICKERS' FL1-16-16P-10 OR FL1-16-16W-10 SAE 4-BOLT FLANGES; DATA ON DRAWING I-250700.

# WEIGHT (APPROXIMATE)

..... 230 LBS.

THIS UNIT IS DESIGNED TO MEET SPECIFICATIONS AS OUTLINED. TO INSURE MAXIMUM UNIT PERFORMANCE IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION, CONSULT YOUR VICKERS APPLICATION ENGINEER IF YOUR:

SPEED IS ABOVE 1800 RPM

FLUID DOES NOT MEET SPECIFICATIONS ON DATA SHEET I-286-S

APPLICATION REQUIRES AN INDIRECT DRIVE

MOUNTING ATTITUDE IS OTHER THAN HORIZONTAL

NEEDS REQUIRE APPLICATION ASSISTANCE

# TYPICAL MODEL CODE

P V B 45 - F R D F - 20 - D (A) (A) - 30

PUMP  
VARIABLE  
DISPLACEMENT  
INLINE PISTON  
UNIT SERIES  
GPM RATING  
AT 1800 RPM  
MOUNTING TYPE  
F - INTEGRAL FOOT  
(OMIT FOR FLANGE  
MOUNTING)  
ROTATION  
(VIEWING SHAFT END)  
R - RIGHT HAND - CW  
L - LEFT HAND - CCW  
SWASH PLATE MOVEMENT  
D - BOTH SIDES OF CENTER  
PORT CONNECTIONS  
F - SAE 4-BOLT FLANGE

DESIGN NUMBER - CONTROL  
SUBJECT TO CHANGE. IN-  
STALLATION DIMENSIONS  
REMAIN AS SHOWN FOR DE-  
SIGN NUMBERS 30 THRU 39

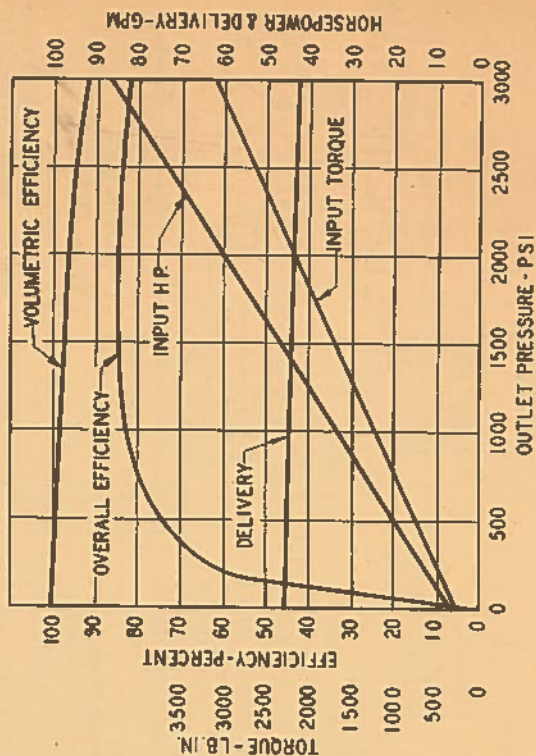
OPTION 2  
A - REPLENISHING PUMP  
(OMIT WHEN NOT INCLUDED)

OPTION 1  
A - CONTROL PUMP ONLY  
(OMIT WHEN NOT INCLUDED)

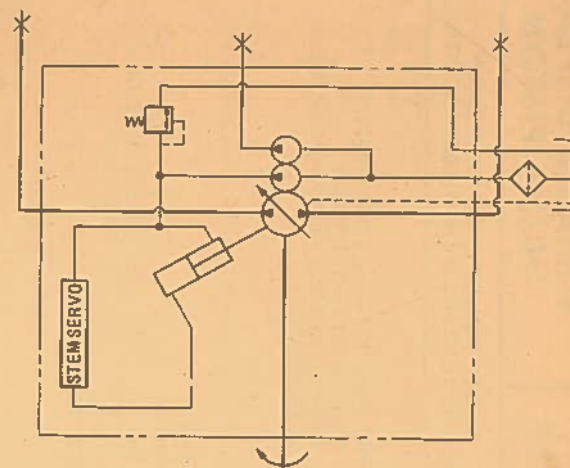
CONTROL  
D - HYDROMECHANICAL CONTROL

DESIGN NUMBER -- PUMP  
SUBJECT TO CHANGE. INSTALLATION DI-  
MENSIONS REMAIN AS SHOWN FOR DESIGN  
NUMBERS 20 THRU 29

# PERFORMANCE CHARACTERISTICS INPUT SPEED - 1800 RPM WITHOUT AUXILIARY PUMP



# STANDARD GRAPHICAL SYMBOLS FOR FLUID POWER DIAGRAMS





REFER TO DRAWING  
517350 FOR SOLENOID  
VALVE DATA.

34 DIA. PILOT  
HOLES FOR DOWELING  
2 HOLES

66 DIA. - 4 HOLES  
FOR MOUNTING

CASE DRAIN CONNECTION  
1.0625-12 UN-2B SAE STRAIGHT THD.  
FOR .750 O.D. TUBING - 2 PLACES (SEE NOTES)

MODEL NO. SHOWN HERE  
.375-16 UNC-2B THD. - .47 DEEP  
FOR EYEBOLT

ELECTRICAL CONDUIT  
CONN. - 1/2 NPTF THD.

2 LEAD WIRES FOR  
EACH COIL APPROXI-  
MATELY 6 INCHES  
LONG WITH NO. 8 SIZE  
TERMINALS ARE PRO-  
VIDED FOR CUSTOMER  
CONNECTION

PERCENT OF FULL YOKE POSITION  
READ OVER THIS SURFACE  
TIGHTEN JAM NUT AFTER ADJUSTING  
YOKE POSITION

SOLENOID DATA  
(SEE CHART)

TO ADJUST SPRING  
CENTERED POSITION  
REMOVE PLUG & TURN  
.25 DIA. ALLEN SCREW

DIRECTION OF  
ROTATION  
SHOWN HERE

RIGHT HAND  
SHAFT  
ROTATION

PORT A & B FACE

1.50 X .437  
SQUARE KEY

ALTERNATE CASE  
DRAIN

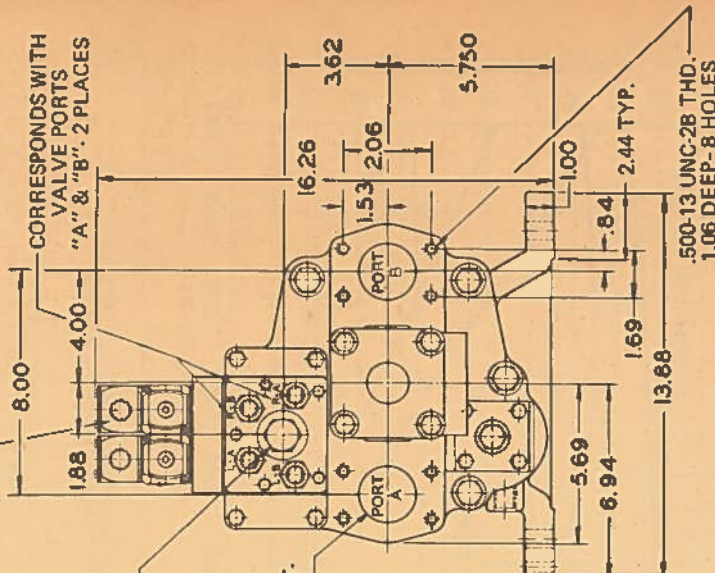
CONTROL PRESSURE RELIEF VALVE DISCHARGE PORT  
.750-16 UNF-2B SAE STRAIGHT THREAD FOR .500 O.D. TUBING  
MUST BE CONNECTED TO TANK BEFORE OPERATING PUMP

REVISED 1-2-76

# VARIABLE DISPLACEMENT INLINE PISTON PUMP

SPERRY-VICKERS  
T.M.

MODEL SERIES PVB45-F\*DF-2\*-SAA-3\*  
ELECTRIC STEP CONTROL WITH INTEGRAL CONTROL PUMP



MODELS: PVB45-FRDF-2\*-SAA-3\*  
PVB45-FLDF-2\*-SAA-3\*

509010A

SPERRY-VICKERS  
TROY, MICHIGAN 48084

VARIABLE DISPLACEMENT  
PISTON PUMP

45 GPM AT  
3000 PSI

SOLENOID STEP  
CONTROL

DWG. NO.  
509010A



## GENERAL DATA

THIS UNIT IS OF THE AXIAL PISTON, VARIABLE DISPLACEMENT, INLINE DESIGN RATED AT 45 GPM AT 1800 RPM AND 1500 PSI. DISPLACEMENT IS CONTROLLED BY A STEP CONTROL WHICH OPERATES BOTH SIDES OF CENTER PERMITTING BIDIRECTIONAL FLOW CHARACTERISTICS. SHAFT ROTATION IS AS TABULATED AND IS NOT REVERSIBLE. A RELIEF VALVE IS REQUIRED.

## CONTROL FUNCTION

THE ELECTRIC STEP CONTROL PROVIDES FOUR ELECTRICALLY SELECTED FLOW POSITIONS WHICH ARE INFINITELY ADJUSTABLE THROUGHOUT THE ENTIRE FLOW RANGE OF THE PUMP. THE FOUR POSITIONS ARE OBTAINABLE ON EITHER SIDE OF CENTER IN DIFFERENT COMBINATIONS, SUCH AS ALL FOUR POSITIONS ON ONE SIDE, THREE ON ONE SIDE AND ONE ON THE OTHER SIDE, TWO ON ONE SIDE AND TWO ON THE OTHER SIDE. IN ADDITION, A FIFTH POSITION MAY BE OBTAINED BY ADJUSTING THE CENTERING SCREW OFF-CENTER FOR FLOWS UP TO 10% ON EITHER SIDE OF THE CENTER POSITION.

## CONTROL MECHANISM

BASICALLY, THE CONTROL IS A STEM-SERVO TYPE OF CONTROL. THE SERVO-STEM IS ACTUATED BY SMALL SINGLE ACTING HYDRAULIC CYLINDERS WHICH IN TURN ARE CONTROLLED BY TWO DG4V DIRECTIONAL VALVES. EACH VALVE CONTROLS TWO CYLINDERS. THE STROKE OF THE CYLINDERS IS ADJUSTABLE TO PROVIDE A PRE-SELECTED POSITION TO WHICH THE PUMP YOKE CAN BE MOVED. THE CYLINDERS AND CONTROL VALVES ARE LABELED FOR PROPER IDENTIFICATION OF THE CYLINDER AND ITS RESPECTIVE CONTROL VALVE AND PORT. FOR EXAMPLE, WHEN SOLENOID "A" OF "VALVE L" IS ENERGIZED, FLOW IS DIRECTED TO PORT "B" TO ACTUATE CYLINDER "L-B", OR WHEN SOLENOID "A" OF "VALVE R" IS ENERGIZED, FLOW IS DIRECTED TO PORT "B" TO ACTUATE CYLINDER "R-B".

THE ADJUSTOR INDICATOR IS CALIBRATED TO THE APPROXIMATE PERCENTAGE OF FULL FLOW; i.e., 2-20%, 5-50%, ETC. TO SET THE PUMP FLOW, THE LOCK NUT IS LOOSENED AND THE ADJUSTING SCREW IS SET AT THE DESIRED FLOW AND THEN SECURED IN POSITION WITH THE LOCK NUT.

THE CENTERING SPRING RETURNS YOKE TO CENTER POSITION WHEN ALL SOLENOIDS ARE DE-ENERGIZED, OR IF POWER FAILS. THIS POSITION CAN BE ADJUSTED FOR CENTER OR ZERO FLOW, OR FOR FLOWS UP TO  $\pm 10\%$ .

NOTE: ANY SLIDING SPOOL VALVE, IF HELD SHIFTED UNDER PRESSURE FOR LONG PERIODS OF TIME, MAY STICK AND NOT SPRING RETURN DUE TO FLUID RESIDUE FORMATION AND, THEREFORE, SHOULD BE CYCLED PERIODICALLY TO PREVENT THIS FROM HAPPENING.

SOLENOID DATA	115/120 V ac 60 Hz - 110 V ac 50 Hz
INRUSH amps (R.M.S.)	2.0
HOLDING amps	.4

● MAXIMUM PEAK INRUSH amps APPROXIMATELY 1.4 X R.M.S. VALUE SHOWN.

## INSTALLATION INFORMATION

HORIZONTAL MOUNTING IS RECOMMENDED TO MAINTAIN NECESSARY CASE FLUID LEVEL. THE CASE DRAIN LINE MUST BE FULL SIZE UNRESTRICTED AND CONNECTED FROM THE UPPERMOST DRAIN PORT DIRECTLY TO THE RESERVOIR IN SUCH A MANNER THAT THE HOUSING REMAINS FILLED WITH FLUID. PIPING OF DRAIN LINE MUST PREVENT SIPHONING. PIPE DRAIN LINE SO THAT IT TERMINATES BELOW RESERVOIR FLUID LEVEL. NO OTHER LINES ARE TO BE CONNECTED TO THIS DRAIN LINE. CAUTION MUST BE EXERCISED TO NEVER EXCEED 5 PSI UNIT CASE PRESSURE.

## STARTING

BEFORE STARTING, FILL CASE WITH SYSTEM FLUID THRU UPPERMOST DRAIN PORT. HOUSING MUST BE KEPT FULL AT ALL TIMES TO PROVIDE INTERNAL LUBRICATION.

WHEN FIRST STARTING, IT MAY BE NECESSARY TO BLEED AIR FROM PUMP OUTLET LINE TO PERMIT PRIMING AND REDUCE NOISE. BLEED BY LOOSENING AN OUTLET CONNECTION UNTIL SOLID STREAM OF FLUID APPEARS. AN AIR-BLEED VALVE IS AVAILABLE FOR THIS PURPOSE. SEE DRAWING 521601.

TO ASSIST INITIAL PRIMING, CONTROL SETTING MUST BE AT LEAST 40% OF MAXIMUM FLOW POSITION.

## OPERATING SPECIFICATIONS

THEORETICAL DISPLACEMENT..... 5.76 CU. IN./REV.

## DELIVERY

AT 1800 RPM..... 45 GPM  
AT 2200 RPM..... 55 GPM

## OPERATING SPEED

RATED..... 1800 RPM  
MAXIMUM..... 2200 RPM

## OPERATING PRESSURE

MAXIMUM..... 3000 PSI

## INLET PRESSURE (MINIMUM)

..... 50 PSI

## DRIVE ROTATION

SHAFT ROTATION IS NOT REVERSIBLE AND MUST BE SPECIFIED WHEN ORDERING.

## FILTRATION

PRESSURE OR RETURN LINE..... 25 MICRONS  
INLET..... 149 MICRONS

## FLUIDS

CLEAN PETROLEUM ANTIWEAR INDUSTRIAL HYDRAULIC OIL OR AUTOMOTIVE CRANKCASE OIL DESIGNATED SC, SD OR SE. RUNNING VISCOSITY RANGE 70-250 SUS. OPERATING TEMPERATURE 120° F RECOMMENDED, 150° F USUAL MAXIMUM. REFER TO PVB FLUID/LIFE CHART AND DATA SHEET I-286-S (SECTION L) FOR HYDRAULIC FLUID AND TEMPERATURE RECOMMENDATIONS.

## FLANGES

BOTH INLET AND OUTLET PORTS ACCEPT SPERRY VICKERS' FL1-16-16P-10 OR FL1-16-16W-10 SAE 4-BOLT FLANGES; DATA ON DRAWING I-250700.

## WEIGHT (APPROXIMATE)

..... 250 LBS.

THIS UNIT IS DESIGNED TO MEET SPECIFICATIONS AS OUTLINED. TO INSURE MAXIMUM UNIT PERFORMANCE IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION, CONSULT YOUR SPERRY VICKERS APPLICATION ENGINEER IF YOUR:

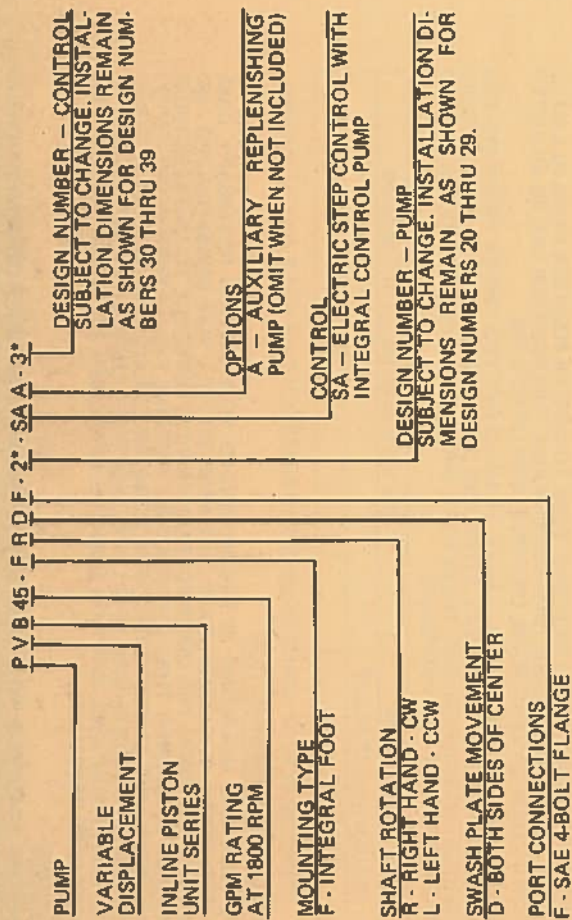
SPEED IS ABOVE 1800 RPM

MOUNTING ATTITUDE IS OTHER THAN HORIZONTAL

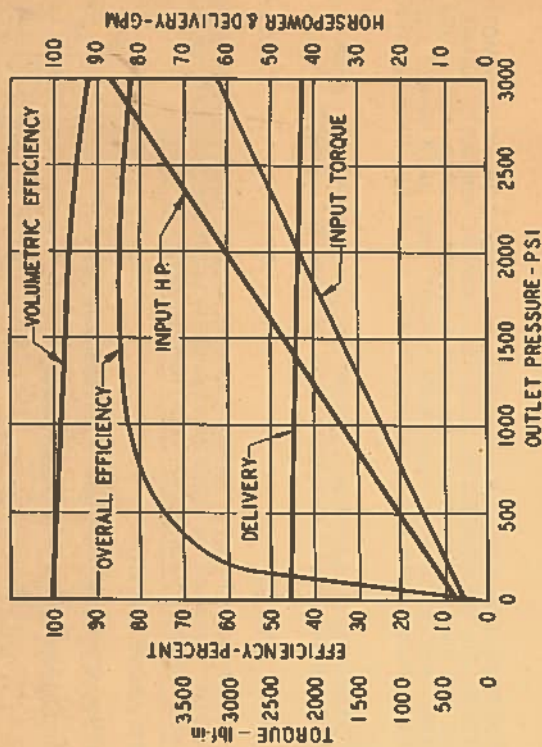
NEEDS REQUIRE APPLICATION ASSISTANCE



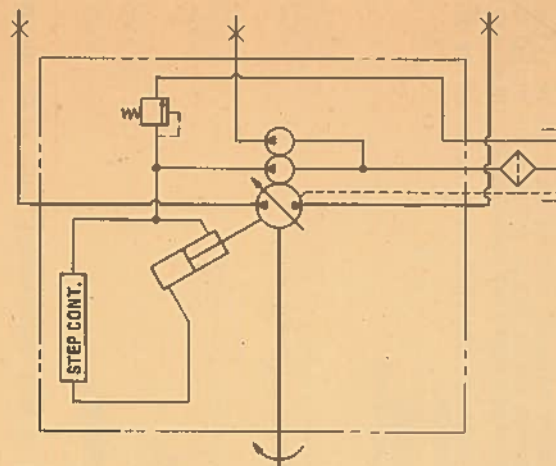
# TYPICAL MODEL CODE



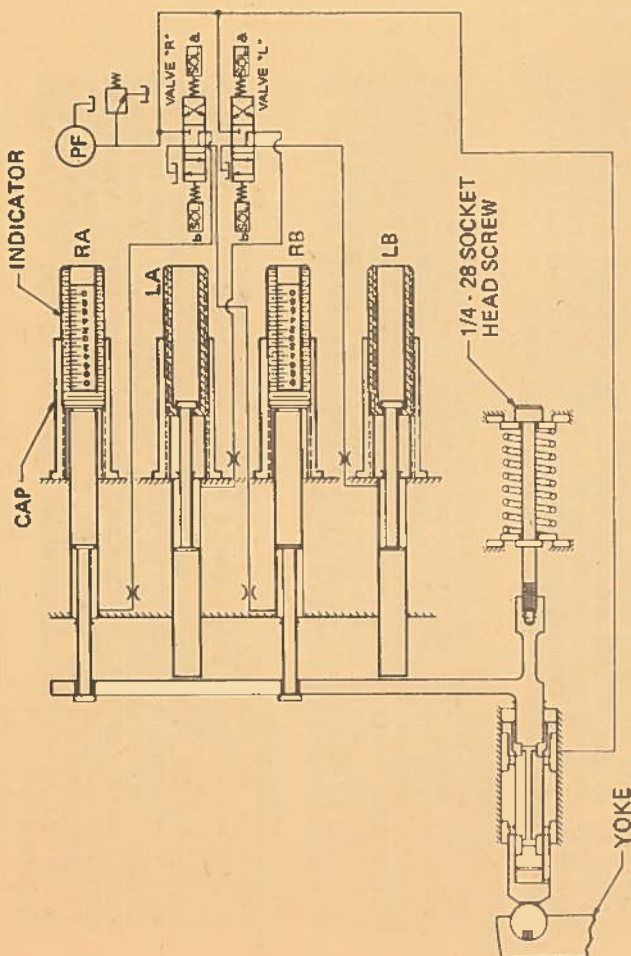
## PERFORMANCE CHARACTERISTICS INPUT SPEED - 1800 RPM WITHOUT AUXILIARY PUMP



## STANDARD GRAPHICAL SYMBOLS FOR FLUID POWER DIAGRAMS



## SIMPLIFIED SCHEMATIC "S" CONTROL





## INSTRUCTIONS FOR TYPICAL FLOW CYCLE

### GENERAL INSTRUCTIONS:

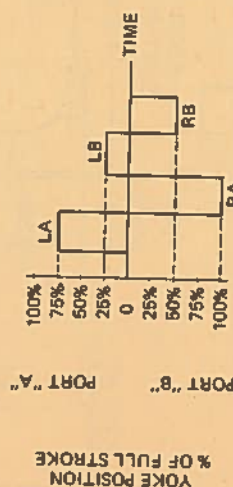
ASSUME THAT THE DESIRED MACHINE CYCLE IS AS SHOWN ON THE DIAGRAMS. DUE TO INHERENT MANUFACTURING TOLERANCES, THE FLOW SCALE IS ACCURATE ONLY TO WITHIN ABOUT  $\pm 2\%$ . FOR GREATER ACCURACY, A FLOW METER MUST BE USED IN THE OUTLET LINE WITH THE OUTLET PRESSURE SET AT THE DESIRED OPERATING PRESSURE. WHEN USING A FLOWMETER IN THE OUTLET LINE, ENERGIZE THE RESPECTIVE SOLENOID FOR THE POSITION BEING ADJUSTED. THE FLOW WILL VARY DIRECTLY AS THE ADJUSTOR SCREW IS TURNED. FOR THE EXAMPLES SHOWN, PUMP ROTATION IS CW. PORTS "A" AND "B" ARE REVERSED FOR CCW ROTATION OF THE PUMP. TIGHTEN JAM NUTS AFTER ADJUSTMENT IS COMPLETE.

NOTE: (1) WHEN THE CENTERING SPRING CHAMBER PLUG IS REMOVED, OIL WILL DRAIN FROM THE SPRING CHAMBER.

(2) FOR THE POSITION SHOWN ON THE DIAGRAMS, ZERO OUTLET PRESSURE IS ASSUMED. TO CORRECT FOR SLIPPAGE AT HIGHER PRESSURES, ADD THE PERCENTAGE REDUCTION IN VOLUMETRIC EFFICIENCY TO THE DESIRED YOKE POSITION. FOR EXAMPLE, IF THE DESIRED YOKE POSITION IS 50%, AND THE VOLUMETRIC EFFICIENCY IS 97%, SET THE ADJUSTOR AT 53%.

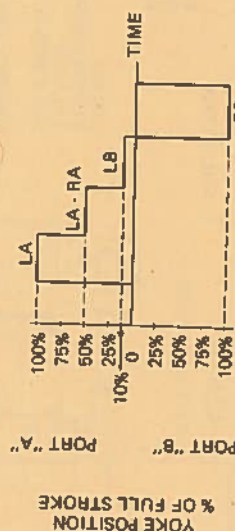
CAUTION: SOLENOIDS LA AND LB MUST NEVER BE ENERGIZED SIMULTANEOUSLY. LIKEWISE, SOLENOIDS RA AND RB MUST NOT BE ENERGIZED SIMULTANEOUSLY. NONCOMPLIANCE WITH THE ABOVE WILL RESULT IN FAILURE OF THE SOLENOIDS.

TYPICAL EXAMPLE NO. 1



1. DE-ENERGIZE ALL SOLENOIDS. REMOVE PLUG BEHIND CENTERING SPRING. ADJUST ONE QUARTER INCH DIAMETER SOCKET HEAD SCREW UNTIL ZERO PRESSURE IS OBTAINED ON PORTS "A" AND "B". REPLACE PLUG.
2. TURN ADJUSTOR SCREW LA CW FROM ZERO MARK UNTIL THE 75% MARK ON THE SCALE ALIGNS WITH TOP OF CAP.
3. TURN ADJUSTOR SCREW RA CCW FROM ZERO MARK UNTIL THE 100% MARK ON THE SCALE ALIGNS WITH THE TOP OF CAP.
4. TURN ADJUSTOR SCREW LB CW FROM ZERO MARK UNTIL THE 25% MARK ON THE SCALE ALIGNS WITH THE TOP OF CAP.
5. TURN ADJUSTOR SCREW RB CCW FROM ZERO MARK UNTIL THE 50% MARK ON THE SCALE ALIGNS WITH THE TOP OF CAP.

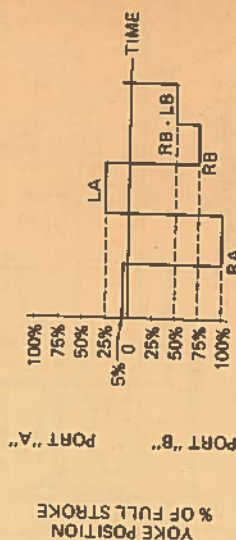
TYPICAL EXAMPLE NO. 2



1. ADJUST SPRING CENTERED POSITION AS IN ITEM 1 OF EXAMPLE 1.
2. TURN ADJUSTOR SCREW LA CW FROM ZERO MARK UNTIL THE 100% MARK ON THE SCALE ALIGNS WITH THE TOP OF THE CAP.
3. TURN ADJUSTOR SCREW RA CW FROM ZERO MARK UNTIL THE 50% MARK ON THE SCALE ALIGNS WITH THE TOP OF THE CAP.
4. TURN ADJUSTOR SCREW LB CW FROM ZERO MARK UNTIL THE 10% MARK ON THE SCALE ALIGNS WITH THE TOP OF THE CAP.
5. TURN ADJUSTOR SCREW RB CCW FROM ZERO MARK UNTIL THE 100% MARK ON THE SCALE ALIGNS WITH THE TOP OF THE CAP.

NOTE: ENERGIZE SOLENOIDS LA AND RA SIMULTANEOUSLY FOR THE 50% POSITION ON PORT "A" AS INDICATED ON THE CYCLE DIAGRAM. ADJUSTOR SCREW LA MUST BE SET AT GREATER FLOW THAN ADJUSTOR SCREW RA. FOR EXAMPLE, ENERGIZING SOLENOIDS RA AND LB WOULD NOT RESULT IN THE DESIRED FLOW POSITION OF 50%. SOLENOID LB COULD BE USED, HOWEVER, IF THE FLOW POSITION LB WAS GREATER THAN 50%.

TYPICAL EXAMPLE NO. 3



1. TURN CENTERING SPRING SCREW CCW UNTIL 5% OF FULL FLOW IS OBTAINED. A FLOW METER WILL BE NECESSARY TO MEASURE THE OUTLET FLOW.
2. TURN ADJUSTOR SCREW RA CCW FROM THE ZERO MARK UNTIL THE 105% MARK ON THE SCALE ALIGNS WITH THE TOP OF THE CAP. (100% + 5% OFFSET)
3. TURN ADJUSTOR SCREW LA CW FROM THE ZERO MARK UNTIL THE 20% MARK ON THE SCALE ALIGNS WITH THE TOP OF THE CAP. (25% - 5% OFFSET)
4. TURN ADJUSTOR SCREW RB CCW FROM THE ZERO MARK UNTIL THE 80% MARK ON THE SCALE ALIGNS WITH THE TOP OF THE CAP.
5. TURN ADJUSTOR SCREW LB CCW FROM THE ZERO MARK UNTIL THE 55% MARK ON THE SCALE ALIGNS WITH THE TOP OF THE CAP.

NOTE: FOR THE 50% FLOW POSITION, SOLENOIDS RB AND LB MUST BE ENERGIZED SIMULTANEOUSLY.





# VARIABLE DISPLACEMENT INLINE PISTON PUMP

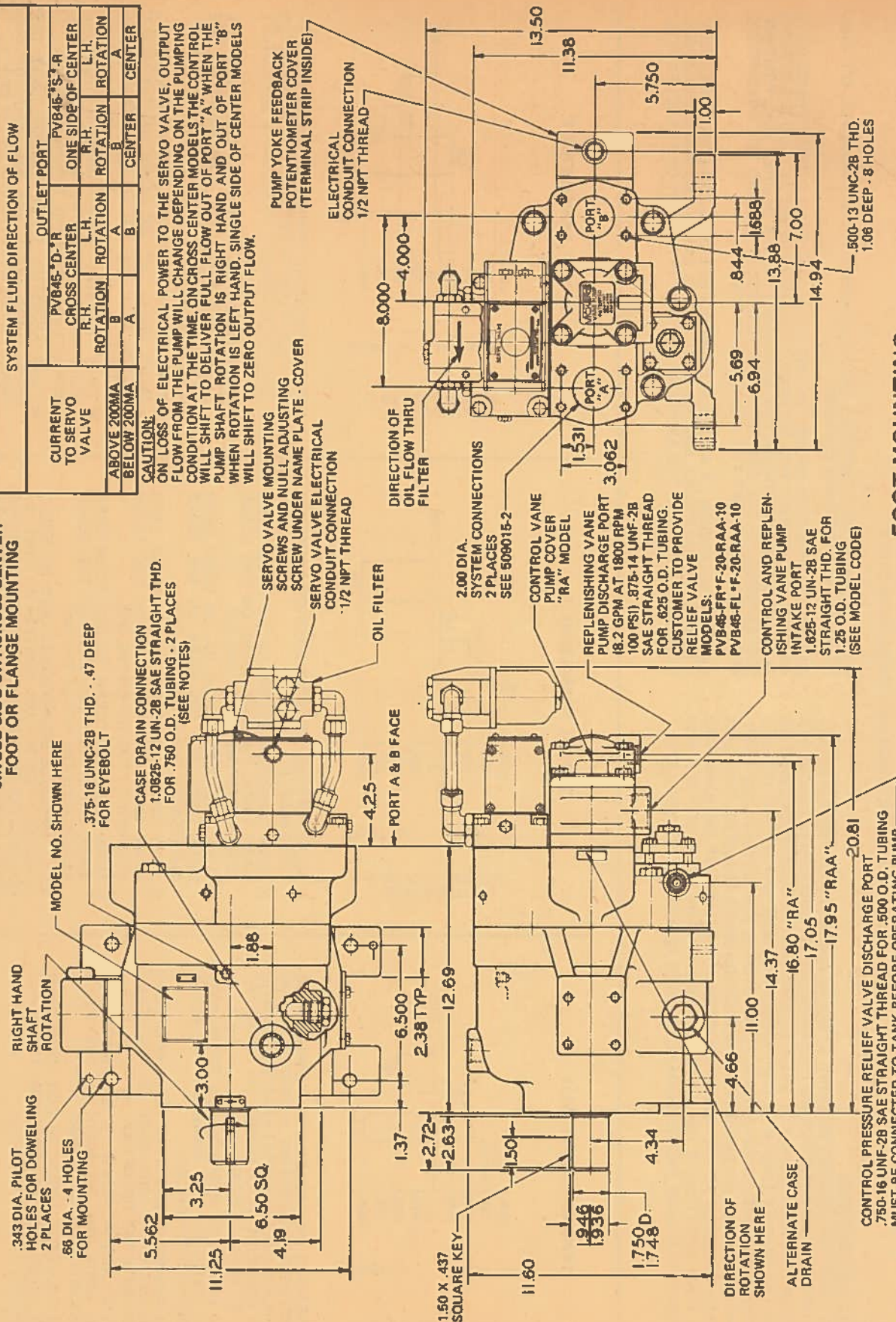
MODEL SERIES PVB45-F-20-RA-10

ELECTRO-HYDRAULIC SERVO CONTROL WITH INTEGRAL  
FOOT OR FLANGE MOUNTING

SYSTEM FLUID DIRECTION OF FLOW					
CURRENT TO SERVO VALVE	PVB45-D-R CROSS CENTER		OUTLET PORT PVB45-S-R ONE SIDE OF CENTER		
	R.H.	L.H.	R.H.	L.H.	
ABOVE 200MA	B	A	ROTATION	ROTATION	ROTATION
BELOW 200MA	A	B	ROTATION	ROTATION	ROTATION
			ROTATION	ROTATION	ROTATION
			ROTATION	ROTATION	ROTATION

## CAUTION:

ON LOSS OF ELECTRICAL POWER TO THE SERVO VALVE, OUTPUT FLOW FROM THE PUMP WILL CHANGE DEPENDING ON THE PUMPING CONDITION AT THE TIME. ON CROSS CENTER MODELS THE CONTROL WILL SHIFT TO DELIVER FULL FLOW OUT OF PORT "A" WHEN THE PUMP SHAFT ROTATION IS RIGHT HAND AND OUT OF PORT "B" WHEN ROTATION IS LEFT HAND. SINGLE SIDE OF CENTER MODELS WILL SHIFT TO ZERO OUTPUT FLOW.



## FOOT MOUNTING

REVISED 3-1-74

509015

SPERRY-VICKERS  
TROY, MICHIGAN 48064

VARIABLE  
DISPLACEMENT  
PISTON PUMP

45 GPM AT  
3000 PSI

ELECTRO-HYDRAULIC  
SERVO CONTROL

FOOT OR FLANGE  
MOUNTING

DWG. NO.  
509015

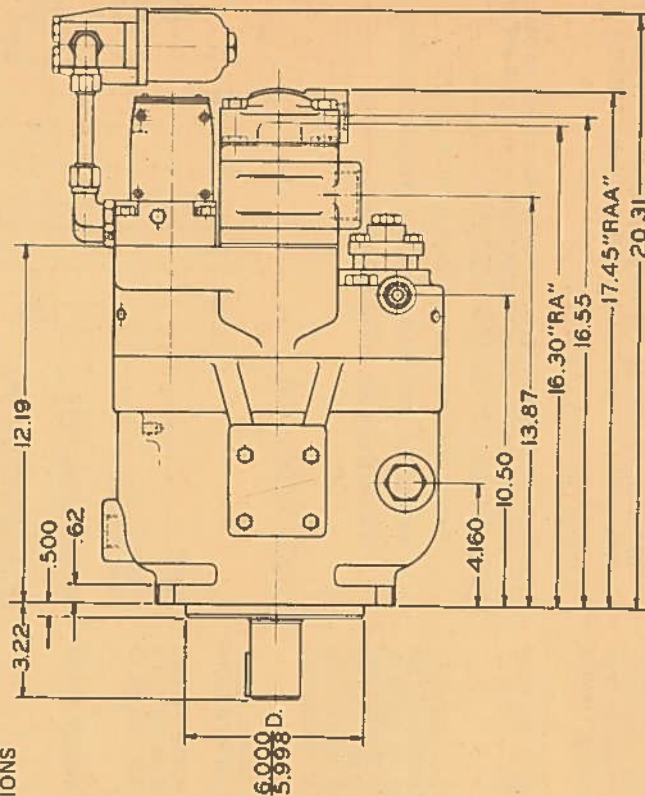
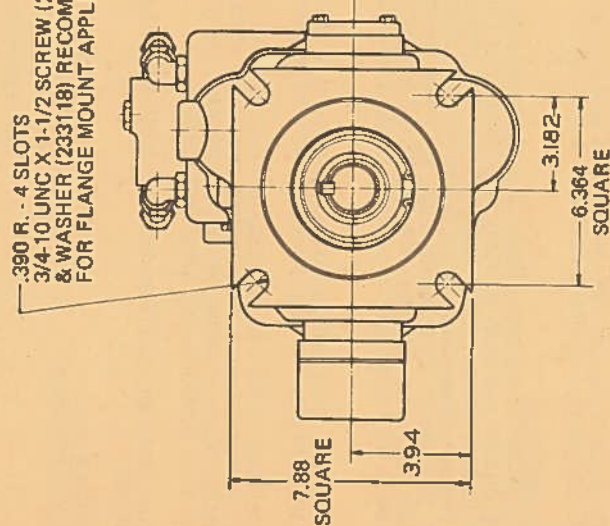




# VARIABLE DISPLACEMENT INLINE PISTON PUMP

MODEL SERIES PVB45-\*\*\*F-20-R\*\*-10  
ELECTRO-HYDRAULIC SERVO CONTROL WITH INTEGRAL CONTROL PUMP  
SINGLE SIDE OR ACROSS CENTER  
FOOT OR FLANGE MOUNTING

390 R - 4 SLOTS  
3/4-10 UNC X 1-1/2 SCREW (212498)  
& WASHER (233118) RECOMMENDED  
FOR FLANGE MOUNT APPLICATIONS



NOTE: SEE PAGE 509015 FOR  
INSTALLATION INFORMATION  
NOT SHOWN.

MODEL: PVB45-\*\*\*F-20-R\*\*-10

## FLANGE MOUNTING



**GENERAL DATA**

THESE UNITS ARE OF THE AXIAL PISTON, VARIABLE DISPLACEMENT INLINE DESIGN. DISPLACEMENT BETWEEN ZERO AND MAXIMUM RATED CAPACITY IS CONTROLLED BY AN ELECTRO-HYDRAULIC DEVICE THROUGH SUITABLE ELECTRONIC GEAR (NOT FURNISHED). ONE OR TWO WAY PUMPING ACTION IS AVAILABLE.

**CONTROL FUNCTION**

PUMP FLOW IS PROPORTIONAL TO THE INPUT VOLTAGE TO THE AMPLIFIER FROM A COMMAND POTENTIOMETER. A YOKE POTENTIOMETER PROVIDES ELECTRICAL FEEDBACK TO THE AMPLIFIER. THESE ELECTRONICS CONTROL AN SF4-140-20-002-10 SERVO VALVE WHICH REGULATES THE SUPPLY OF OIL TO THE LARGE CONTROL PISTON ACTUATING THE PUMP YOKE. A 10 MICRON FILTER IS INCLUDED IN THE CONTROL SYSTEM. AN INTEGRAL VANE PUMP PROVIDES THE HYDRAULIC POWER FOR THIS SERVO CONTROL.

ADDITIONAL SPECIFICATIONS ON THE SF4 SERIES SERVO VALVE USED ON THIS CONTROL CAN BE OBTAINED FROM INSTALLATION DRAWING 501170.

**INSTALLATION INFORMATION**

HORIZONTAL MOUNTING IS RECOMMENDED TO MAINTAIN NECESSARY CASE FLUID LEVEL. THE CASE DRAIN LINE MUST BE FULL SIZE UNRESTRICTED AND CONNECTED FROM THE UPPERMOST DRAIN PORT DIRECTLY TO THE RESERVOIR IN SUCH A MANNER THAT THE HOUSING REMAINS FILLED WITH FLUID. PIPING OF DRAIN LINE MUST PREVENT SIPHONING. PIPE DRAIN LINE SO THAT IT TERMINATES BELOW RESERVOIR FLUID LEVEL. NO OTHER LINES ARE TO BE CONNECTED TO THIS DRAIN LINE. CAUTION MUST BE EXERCISED TO NEVER EXCEED 5 PSI UNIT CASE PRESSURE.

**STARTING**

BEFORE STARTING, FILL CASE WITH SYSTEM FLUID THRU UPPERMOST DRAIN PORT. HOUSING MUST BE KEPT FULL AT ALL TIMES TO PROVIDE INTERNAL LUBRICATION.

WHEN FIRST STARTING, IT MAY BE NECESSARY TO BLEED AIR FROM PUMP OUTLET LINE TO PERMIT PRIMING AND REDUCE NOISE. BLEED BY LOOSENING AN OUTLET CONNECTION UNTIL SOLID STREAM OF FLUID APPEARS. AN AIRBLEED VALVE IS AVAILABLE FOR THIS PURPOSE. SEE DRAWING 521601.

TO ASSIST INITIAL PRIMING, CONTROL SETTING MUST BE AT LEAST 40% OF MAXIMUM FLOW POSITION.

**OPERATING SPECIFICATIONS**

**THEORETICAL DISPLACEMENT** ..... 5.76 CU. IN./REV.

**DELIVERY** ..... SEE CURVE ON FOLLOWING PAGE.

**OPERATING SPEED RATED AND MAXIMUM** ..... 1800 RPM

**OPERATING PRESSURE (MAXIMUM)** ..... 3000 PSI

**INLET PRESSURE ACROSS CENTER MODEL (MIN.)** ..... 75 PSI  
**SINGLE SIDE OF CENTER MODEL** ..... 12.2 PSIA (5" HG. VAC.) MIN.

**DRIVE ROTATION**  
SHAFT ROTATION IS NOT REVERSIBLE AND MUST BE SPECIFIED WHEN ORDERING.

**FILTRATION**

PRESSURE OR RETURN LINE ..... 25 MICRONS  
INLET ..... 149 MICRONS

**FLUIDS**

CLEAN PETROLEUM ANTIWEAR INDUSTRIAL HYDRAULIC OIL OR AUTOMOTIVE CRANKCASE OIL DESIGNATED SC, SD OR SE. RUNNING VISCOSITY RANGE 70-250 SUS. OPERATING TEMPERATURE 120° F RECOMMENDED, 150° F USUAL MAXIMUM. REFER TO DATA SHEET I-286-S (SECTION L) FOR HYDRAULIC FLUID RECOMMENDATIONS.

**FLANGES**

BOTH INLET AND OUTLET PORTS ACCEPT VICKERS' FL1-16-16F-10 OR FL1-16-16W-10 SAE 4-BOLT FLANGES; DATA ON DRAWING I-250700.

**WEIGHT LBS. (APPROXIMATE)** ..... 230

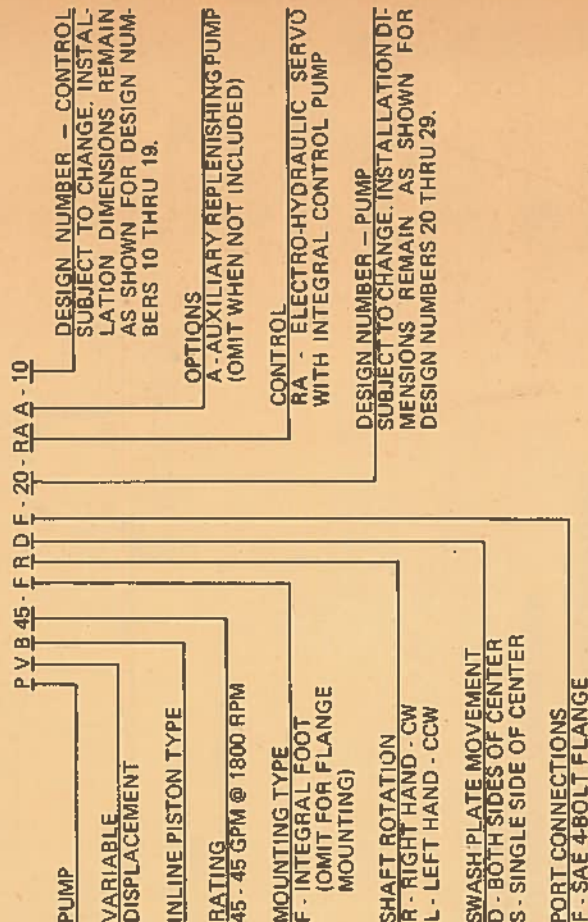
THIS UNIT IS DESIGNED TO MEET SPECIFICATIONS AS OUTLINED. TO INSURE MAXIMUM UNIT PERFORMANCE IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION, CONSULT YOUR VICKERS APPLICATION ENGINEER IF YOUR:

APPLICATION REQUIRES AN INDIRECT DRIVE

MOUNTING ATTITUDE IS OTHER THAN HORIZONTAL

NEEDS REQUIRE APPLICATION ASSISTANCE

**TYPICAL MODEL CODE**

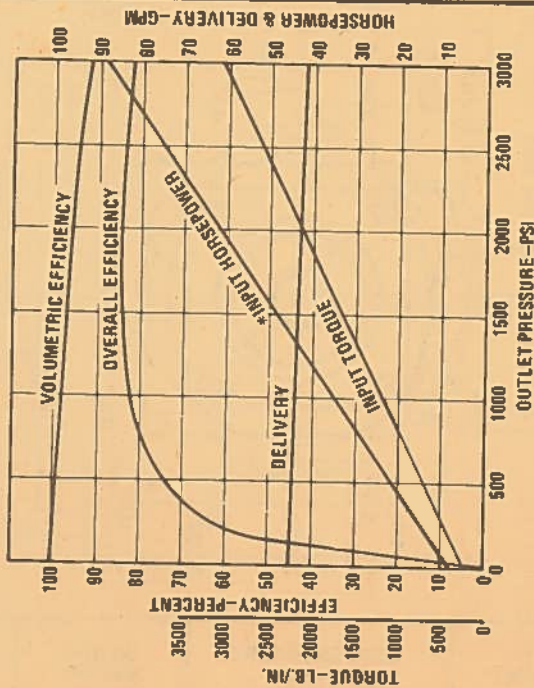




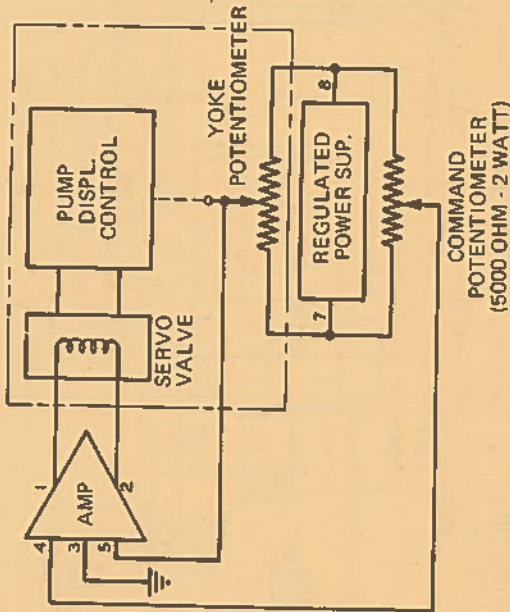
## PERFORMANCE CHARACTERISTICS

INPUT SPEED - 1800 RPM

\*INPUT HP INCLUDES CONTROL PUMP PLUS REPLENISHING PUMP AT 100 PSI



## ELECTRICAL DIAGRAM



## ELECTRICAL SPECIFICATIONS

SERVO VALVE INPUT	
OPERATING CURRENT	0-400 MA
NOMINAL NULL CURRENT	200 MA
POWER REQUIRED	3.2 WATTS
NOMINAL COIL RESISTANCE	20 OHMS
DITHER REQUIRED FOR OPTIMUM PERFORMANCE	50-60 HZ

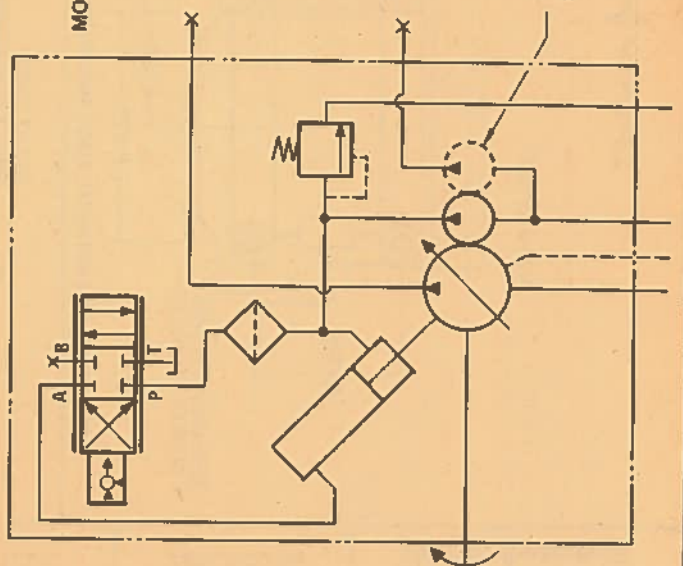
CONSULT YOUR VICKERS APPLICATION ENGINEER TO SUIT YOUR INDIVIDUAL SERVO AMPLIFIER NEEDS.

SUGGESTED SHIELDED HOOK-UP WIRE YOKO POTENTIOMETER TO CONTROL PANEL BELDEN NO. 8971 OR EQUIVALENT 3 WIRE NO. 18 GAGE.

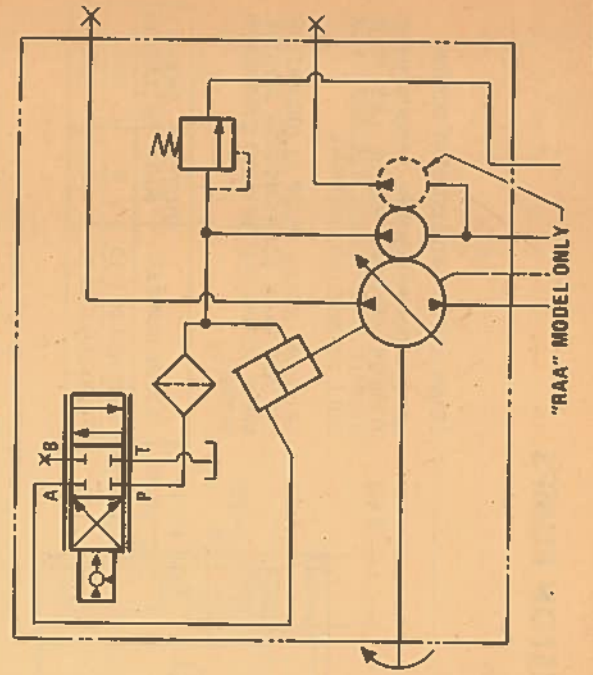
SHIFT TIME (SECONDS APPROX.)	1200 RPM	1800 RPM
FULL TO FULL STROKE	.35	.26
ZERO TO FULL	.17	.16
FULL TO ZERO	.16	.12

## STANDARD GRAPHICAL SYMBOLS FOR FLUID POWER DIAGRAMS

MODELS PVB45-\*\*SF-20-RAA-10



MODELS PVB45-\*\*DF-20-RA-10

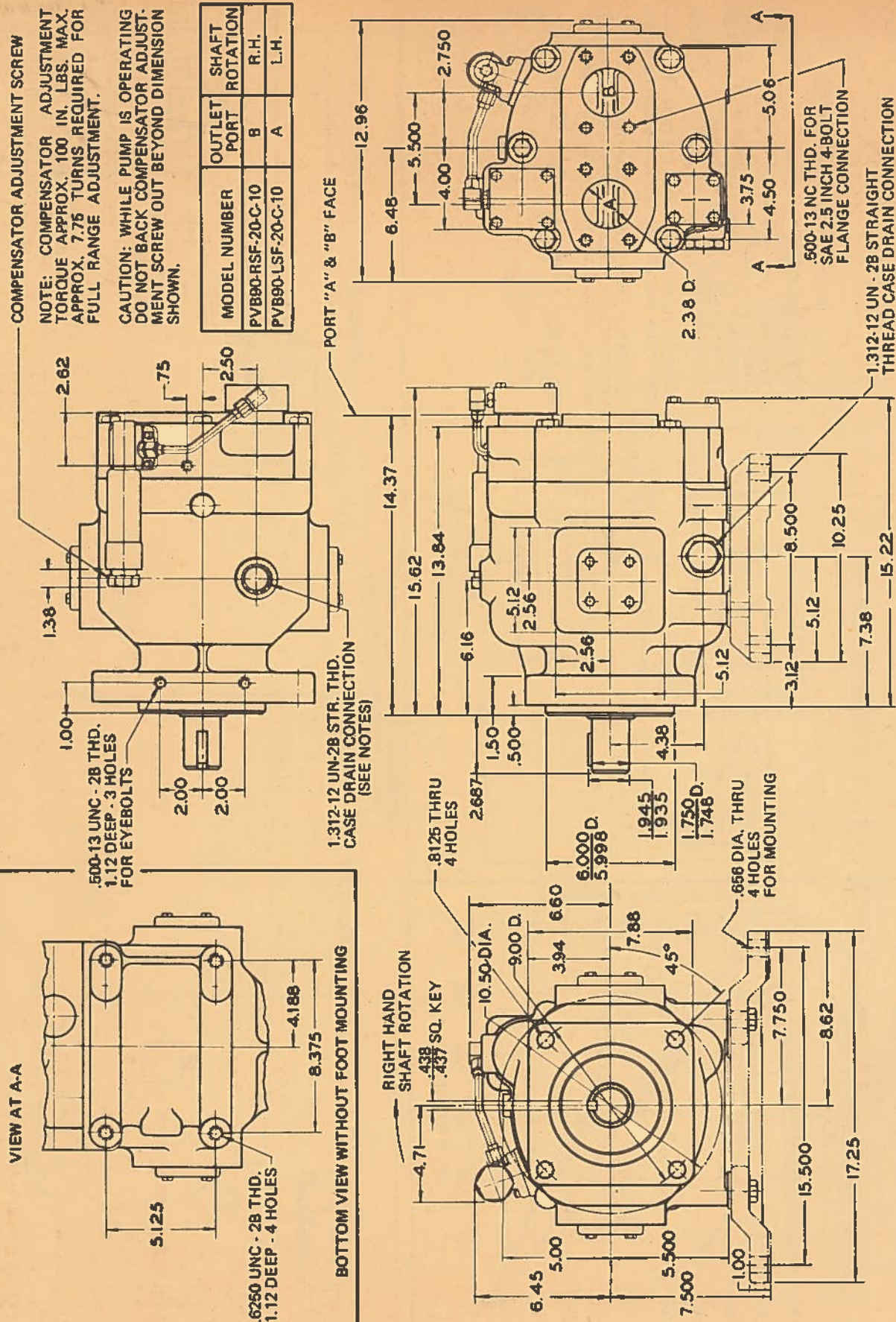


509015-3



STRENGTHENERS

**MODEL SERIES PVB90 INLINE TYPE  
WITH PRESSURE COMPENSATOR CONTROL**



REVISÉ 3.1.74

509020





## VARIABLE DISPLACEMENT PISTON PUMPS

MODEL SERIES PVB90 INLINE TYPE  
WITH PRESSURE COMPENSATOR CONTROL

### GENERAL DATA

THIS UNIT IS OF THE AXIAL PISTON, VARIABLE DISPLACEMENT INLINE DESIGN RATED AT 90 GPM, 1800 RPM, AND 1500 PSI. DISPLACEMENT IS CONTROLLED BY A PRESSURE COMPENSATOR CONTROL.

### PRESSURE COMPENSATOR CONTROL

THE PRESSURE COMPENSATOR CONTROL AUTOMATICALLY ADJUSTS PUMP DELIVERY TO MAINTAIN VOLUME REQUIREMENTS OF THE SYSTEM AT A PRESELECTED OPERATING PRESSURE. MAXIMUM PUMP DELIVERY IS MAINTAINED TO APPROXIMATELY 250 PSI BELOW THE PRESSURE CONTROL SETTING BEFORE BEING REDUCED. THE COMPENSATOR CONTROL IS USED WITH ONE SIDE OF CENTER PUMP. THE COMPENSATOR CONTROL HAS AN ADJUSTMENT RANGE FROM 275-3000 PSI.

A RELIEF VALVE IS RECOMMENDED TO PROTECT AGAINST PRESSURE OVERRIDE DURING PUMP YOKE TRAVEL.

### INSTALLATION INFORMATION

HORIZONTAL MOUNTING IS RECOMMENDED TO MAINTAIN NECESSARY CASE FLUID LEVEL. THE CASE DRAIN LINE MUST BE FULL SIZE UNRESTRICTED AND CONNECTED FROM THE UPPERMOST DRAIN PORT DIRECTLY TO THE RESERVOIR IN SUCH A MANNER THAT THE HOUSING REMAINS FILLED WITH FLUID. PIPING OF DRAIN LINE MUST PREVENT SIPHONING. PIPE DRAIN LINE SO THAT IT TERMINATES BELOW RESERVOIR FLUID LEVEL. NO OTHER LINES ARE TO BE CONNECTED TO THIS DRAIN LINE. CAUTION MUST BE EXERCISED TO NEVER EXCEED 5 PSI UNIT CASE PRESSURE.

### STARTING

BEFORE STARTING, FILL CASE WITH SYSTEM FLUID THRU UPPERMOST DRAIN PORT. HOUSING MUST BE KEPT FULL AT ALL TIMES TO PROVIDE INTERNAL LUBRICATION.

WHEN FIRST STARTING, IT MAY BE NECESSARY TO BLEED AIR FROM PUMP OUTLET LINE TO PERMIT PRIMING AND REDUCE NOISE. BLEED BY LOOSENING AN OUTLET CONNECTION UNTIL SOLID STREAM OF FLUID APPEARS. AN AIRBLEED VALVE IS AVAILABLE FOR THIS PURPOSE. SEE DRAWING 521601.

### OPERATING SPECIFICATIONS

THEORETICAL DISPLACEMENT (MAXIMUM STROKE)..... 12.04 CU. IN./REV.

DELIVERY (THEORETICAL)

AT 1800 RPM..... 93.8 GPM

### OPERATING SPEED

..... 1800 RPM

### OPERATING PRESSURE

MAXIMUM..... 3000 PSI

INLET PRESSURE (MINIMUM)

AT RATED SPEED (SEE CURVE)..... 8 PSI

INPUT HORSEPOWER (MAXIMUM SPEED AND PRESSURE)..... 182 HP

DRIVE ROTATION  
SHAFT ROTATION IS NOT REVERSIBLE AND MUST BE SPECIFIED WHEN ORDERING.

FILTRATION  
PRESSURE OR RETURN LINE..... 25 MICRONS  
INLET..... 149 MICRONS

### FLUIDS

CLEAN PETROLEUM ANTIWEAR INDUSTRIAL HYDRAULIC OIL OR AUTOMOTIVE CRANKCASE OIL DESIGNATED SC, SD OR SE. RUNNING VISCOSITY RANGE 70-250 SUS. OPERATING TEMPERATURE 120°F RECOMMENDED, 150°F USUAL MAXIMUM. REFER TO DATA SHEET 1-286-S (SECTION L) FOR HYDRAULIC FLUID RECOMMENDATIONS.

### FLANGES

BOTH INLET AND OUTLET PORTS ACCEPT VICKERS' FL-1-20-20P-10 OR FL-1-20-20W-10 SAE 4-BOLT FLANGES; DATA ON DRAWING 1-250700.

WEIGHT (APPROXIMATE)..... 228 LBS.

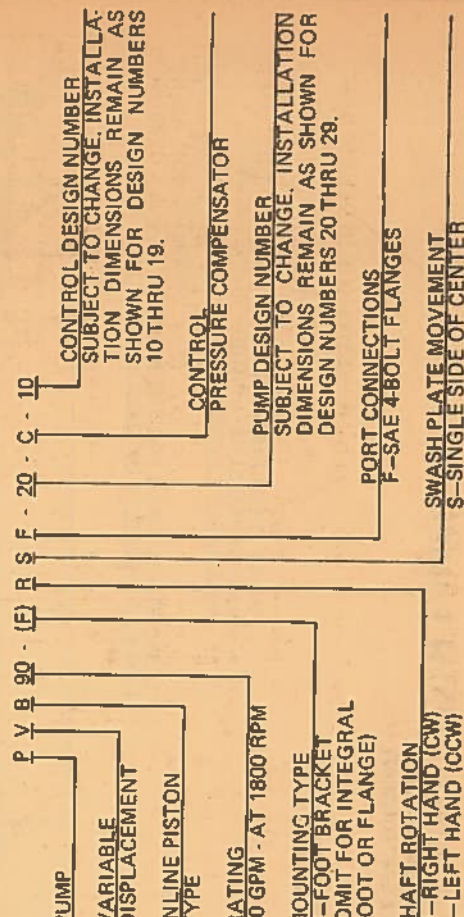
THIS UNIT IS DESIGNED TO MEET SPECIFICATIONS AS OUTLINED. TO INSURE MAXIMUM UNIT PERFORMANCE IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION, CONSULT YOUR VICKERS APPLICATION ENGINEER IF YOU:

APPLICATION REQUIRES AN INDIRECT DRIVE

FIRE RESISTANT FLUID IS TO BE USED

MOUNTING ATTITUDE IS OTHER THAN HORIZONTAL  
NEEDS REQUIRE APPLICATION ASSISTANCE

### MODEL CODE



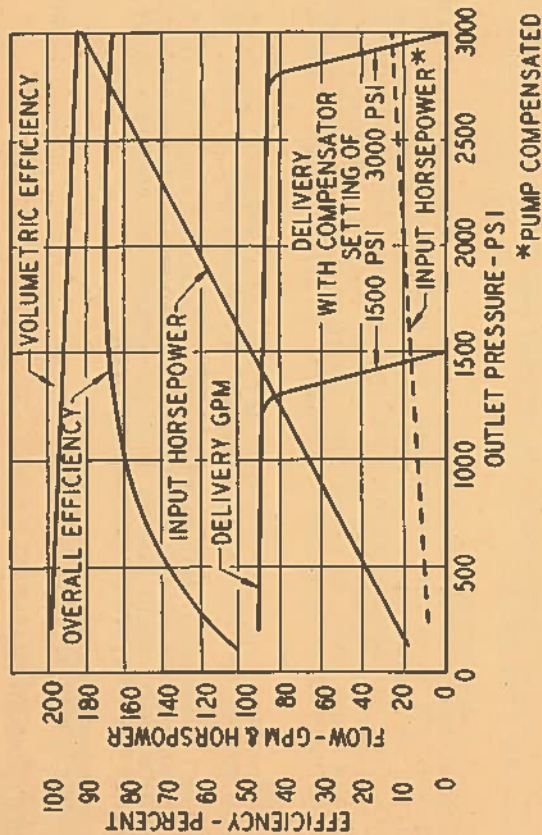




# **VARIABLE DISPLACEMENT PISTON PUMPS** MODEL SERIES PVB90 INLINE TYPE **WITH PRESSURE COMPENSATOR CONTROL**

## **TYPICAL PERFORMANCE CURVES**

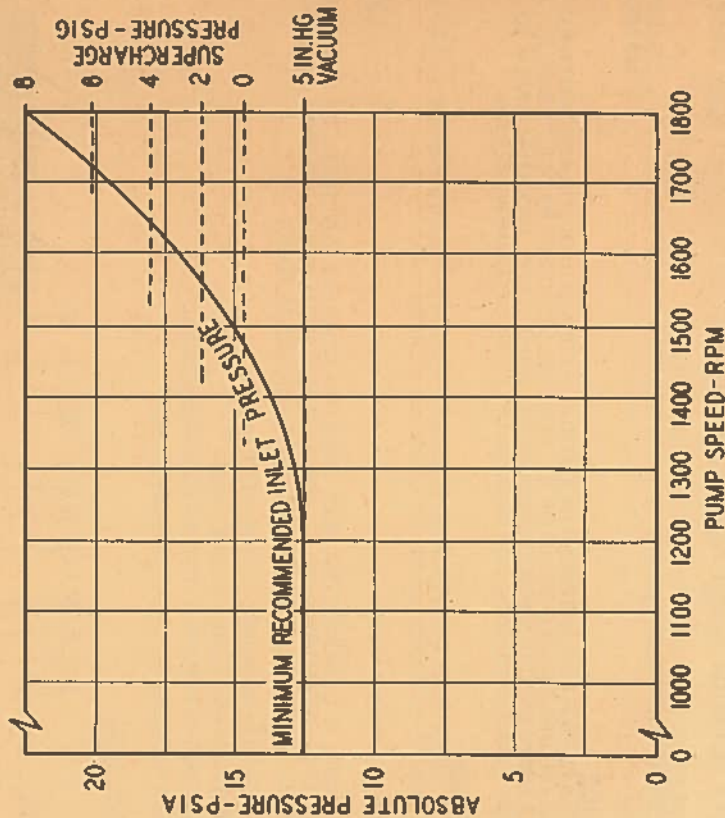
**PERFORMANCE CHARACTERISTICS**  
 BASED ON OIL TEMPERATURE OF 120° F. (100 SUS)  
 INPUT SPEED - 1800 RPM  
 INPUT PRESSURE - 8 PSI



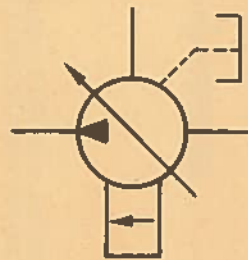
\*PUMP COMPENSATED

**INLET PRESSURE CURVE**  
 MINIMUM PRESSURE AT THE  
 PUMP INLET CONNECTION

BASED ON OIL TEMPERATURE OF 120° F.  
 (100 SUS) VISCOSITY OF 150 SUS @ 100° F.



**STANDARD GRAPHICAL SYMBOL  
 FOR FLUID POWER DIAGRAMS**

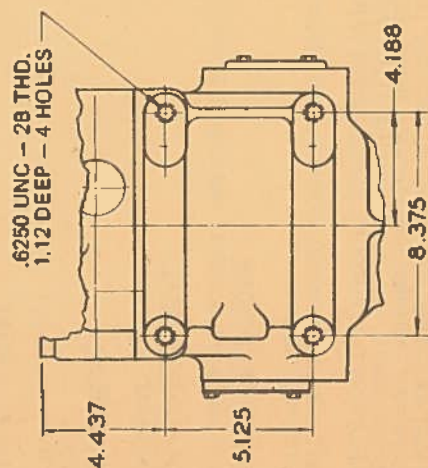




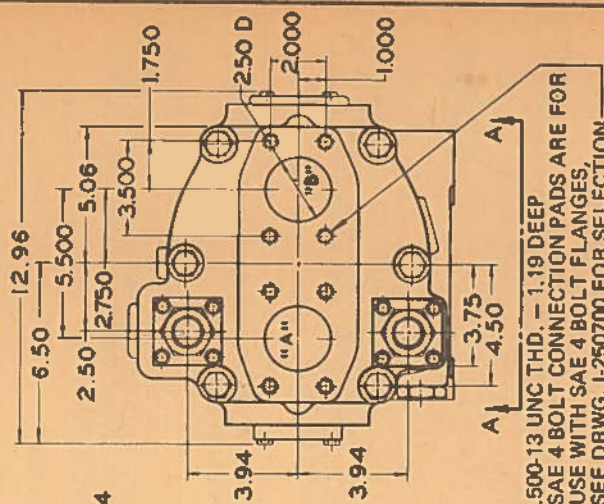
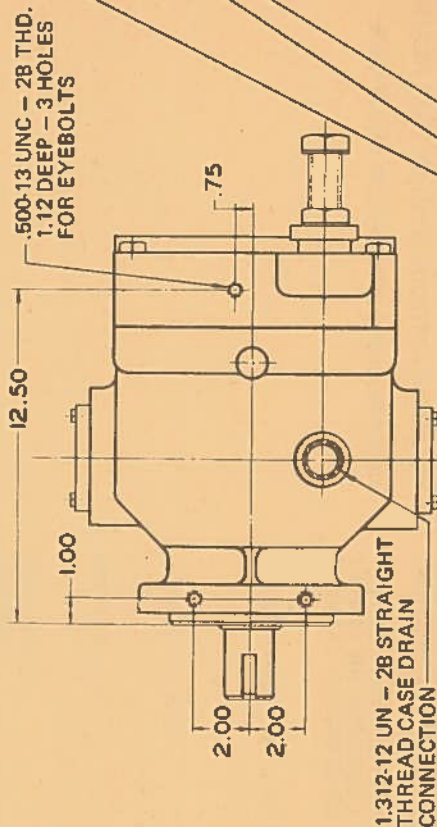
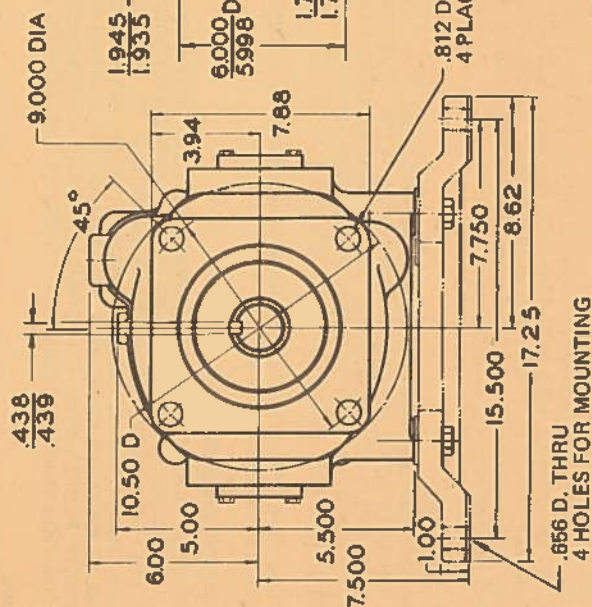
# VICKERS® VARIABLE DISPLACEMENT PISTON PUMPS

PVB90 IN-LINE TYPE WITH MANUAL ADJUSTMENT CONTROL

VIEW AT A-A



BOTTOM VIEW FOR INTEGRAL FOOT MOUNTING



CAUTION:  
DO NOT EXCEED 150 IN.-LBS. TORQUE WHEN BOTTOMING ONE JACKSCREW OUT AGAINST THE OTHER AS PUMP PINTLE BEARINGS MAY BE DAMAGED.

1.3125-12 UN - 28 STRAIGHT THREAD DRAIN CONNECTION

500-13 UNC THD. - 1.19 DEEP SAE 4 BOLT CONNECTION PADS ARE FOR USE WITH SAE 4 BOLT FLANGES, SEE DRWG. I-250700 FOR SELECTION

REVISED TO - 1 - 70

509021

SEC. C

VICKERS DIVISION  
OF SPERRY RAND CORPORATION  
TROY, MICHIGAN 48064

PISTON PUMP  
IN-LINE TYPE

VARIABLE  
DISPLACEMENT

MANUAL  
CONTROL

90 GPM  
3000 PSI

DWG. NO.  
509021



# GENERAL DATA

THIS UNIT IS OF THE AXIAL PISTON, VARIABLE DISPLACEMENT, INLINE DESIGN RATED AT 90 GPM AT 1800 RPM AND 1500 PSI. DISPLACEMENT IS CONTROLLED BY THE MANUAL ADJUSTING SCREWS WHICH OPERATE BOTH SIDES OF CENTER PERMITTING BI-DIRECTIONAL FLOW CHARACTERISTICS. SHAFT ROTATION IS AS TABULATED AND IS NOT REVERSIBLE.

# MANUAL CONTROL

USE OF THE MANUAL ADJUSTING SCREWS PROVIDES CONTROL OF PUMP DELIVERY FLOW FROM ZERO TO MAXIMUM AS WELL AS FLOW REVERSAL, LOOSEN HEX NUTS AND TURN DELIVERY ADJUSTING SCREWS SIMULTANEOUSLY IN OPPOSITE DIRECTIONS TO PROVIDE THE DESIRED FLOW. TIGHTEN THE ADJUSTING SCREWS TO 100-150 IN.-LBS. AND SECURELY TIGHTEN HEX LOCKNUTS.

CAUTION: OVERTIGHTENING OF ADJUSTING SCREWS COULD RESULT IN SERIOUS DAMAGE TO INTERNAL PARTS.

# INSTALLATION INFORMATION

HORIZONTAL MOUNTING IS RECOMMENDED TO MAINTAIN NECESSARY CASE FLUID LEVEL. THE CASE DRAIN LINE MUST BE FULL SIZE UNRESTRICTED AND CONNECTED FROM THE UPPERMOST DRAIN PORT DIRECTLY TO THE RESERVOIR IN SUCH A MANNER THAT THE HOUSING REMAINS FILLED WITH FLUID. PIPING OF DRAIN LINE MUST PREVENT SIPHONING. PIPE DRAIN LINE SO THAT IT TERMINATES BELOW RESERVOIR FLUID LEVEL. NO OTHER LINES ARE TO BE CONNECTED TO THIS DRAIN LINE. CAUTION MUST BE EXERCISED TO NEVER EXCEED 5 PSI UNIT CASE PRESSURE.

# STARTING

BEFORE STARTING, FILL CASE WITH SYSTEM FLUID THRU UPPERMOST DRAIN PORT. HOUSING MUST BE KEPT FULL AT ALL TIMES TO PROVIDE INTERNAL LUBRICATION.

WHEN FIRST STARTING, IT MAY BE NECESSARY TO BLEED AIR FROM PUMP OUTLET LINE TO PERMIT PRIMING AND REDUCE NOISE. BLEED BY LOOSENING AN OUTLET CONNECTION UNTIL SOLID STREAM OF FLUID APPEARS. AN AIRBLEED VALVE IS AVAILABLE FOR THIS PURPOSE. SEE DRAWING 521601.

TO ASSIST INITIAL PRIMING, CONTROL SETTING MUST BE AT LEAST 40% OF MAXIMUM FLOW POSITION.

# OPERATING SPECIFICATIONS

THEORETICAL DISPLACEMENT (MAXIMUM STROKE) ..... 12.04 CU. IN./REV.

# DELIVERY (THEORETICAL)

AT 1800 RPM ..... 93.8 GPM

# OPERATING SPEED

RATED ..... 1800 RPM  
MAXIMUM ..... 1800 RPM

# OPERATING PRESSURE

RATED ..... 1500 PSI  
MAXIMUM ..... 3000 PSI

INLET PRESSURE (MINIMUM AT 1800 RPM) ..... 8 PSIG  
(SEE CURVE)

# DRIVE ROTATION

SHAFT ROTATION IS NOT REVERSIBLE AND MUST BE SPECIFIED WHEN ORDERING.

# FILTRATION

PRESSURE OR RETURN LINE ..... 25 MICRONS  
INLET ..... 149 MICRONS

# FLUIDS

CLEAN PETROLEUM OIL, MEETING OR EXCEEDING LUBRICATING QUALITIES OF SAE 10W MEETING API SERVICE CLASSIFICATION MS (MAXIMUM SEVERITY) IS RECOMMENDED. VISCOSITY RANGE IS 150-225 SUS AT 100° F. FOR HYDRAULIC OIL REQUIREMENTS REFER TO DATA SHEET 1-286-S.

# FLANGES

BOTH INLET AND OUTLET PORTS ACCEPT VICKERS' FL1-20-20P-10 OR FL1-20-20W-10 SAE 4-BOLT FLANGES; DATA ON DRAWING 1-250700.

# WEIGHT (APPROXIMATE)

228 LBS.

THIS UNIT IS DESIGNED TO MEET SPECIFICATIONS AS OUTLINED. TO INSURE MAXIMUM UNIT PERFORMANCE IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION, CONSULT YOUR VICKERS APPLICATION ENGINEER IF YOUR:

APPLICATION REQUIRES AN INDIRECT DRIVE

MOUNTING ATTITUDE IS OTHER THAN HORIZONTAL

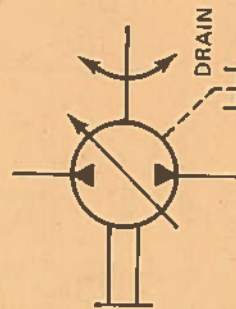
NEEDS REQUIRE APPLICATION ASSISTANCE



# MODEL CODE

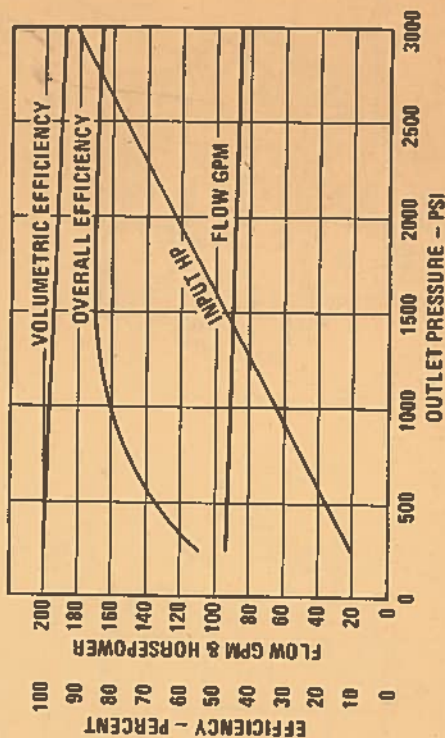
P	V	B	90	-	(F)	+	D	F	-	20	-	H	-	10
CONTROL DESIGN NUMBERS SUBJECT TO CHANGE. INSTALLATION DIMENSIONS REMAIN AS SHOWN FOR DE- SIGN NUMBERS 10 THROUGH 19.														
CONTROL														
MANUAL ADJUSTMENT														
PUMP DESIGN NUMBER SUBJECT TO CHANGE. INSTALLATION DIMENSIONS REMAIN AS SHOWN FOR DESIGN NUMBERS 20 THROUGH 29.														
PORT CONNECTIONS F - SAE 4 BOLT FLANGES SWASH PLATE MOVEMENT D - BOTH SIDES OF CENTER ROTATION (VIEWING SHAFT END) R - RIGHT HAND L - LEFT HAND														
MOUNTING TYPE F - FOOT BRACKET OMIT WHEN NOT DESIRED GPM RATING @ 1800 RPM														
INLINE PISTON UNIT SERIES														
VARIABLE DISPLACEMENT														
PUMP														

## STANDARD GRAPHICAL SYMBOL FOR FLUID POWER DIAGRAMS



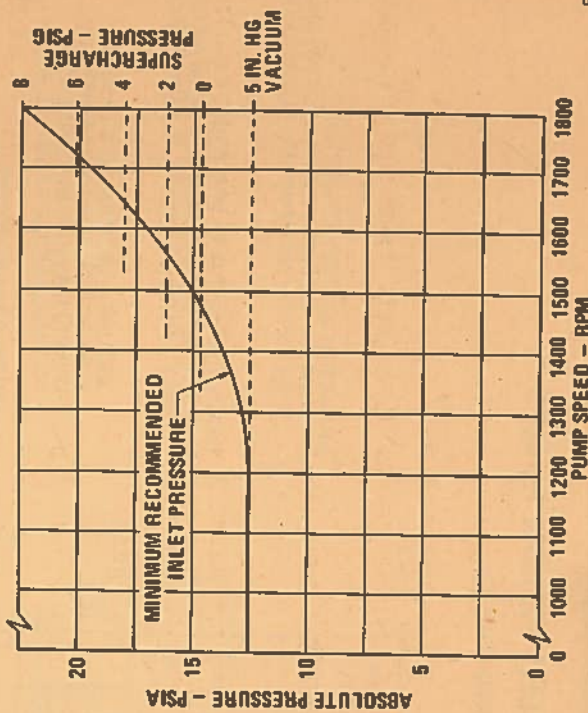
## TYPICAL PERFORMANCE CURVES

PERFORMANCE CHARACTERISTICS  
BASED ON OIL TEMPERATURE OF 120° F. (115 SUS)  
INPUT SPEED - 1800 RPM  
INLET PRESSURE - 8 PSI



## INLET PRESSURE CURVE

MINIMUM PRESSURE AT THE  
PUMP INLET CONNECTION  
BASED ON OIL TEMPERATURE OF 120° F.  
(100 SUS) VISCOSITY OF 150 SUS @ 100° F.













**VICKERS** HYDRAULIC POWER PACK  
WITH ADJUSTABLE RELIEF VALVE  
1/4 PIPE THREAD CONNECTIONS

MODEL NUMBERS	MAXIMUM DRIVE SPEED R. P. M.	DELIVERY G.P.M. AT 1200 R.P.M. PRESSURE P.S.I. 250 300 750 1000	WEIGHT LESS OIL APPROX.
PKS-1000-0	2500	1.5 1.3 1.0 0.8	35 LBS.
PKS-2000-0	2500	2.4 2.2 2.0 1.7	35 LBS.

PK1-1000-D	PK2-2000-D	1.7 M.P.	2.3 M.P.
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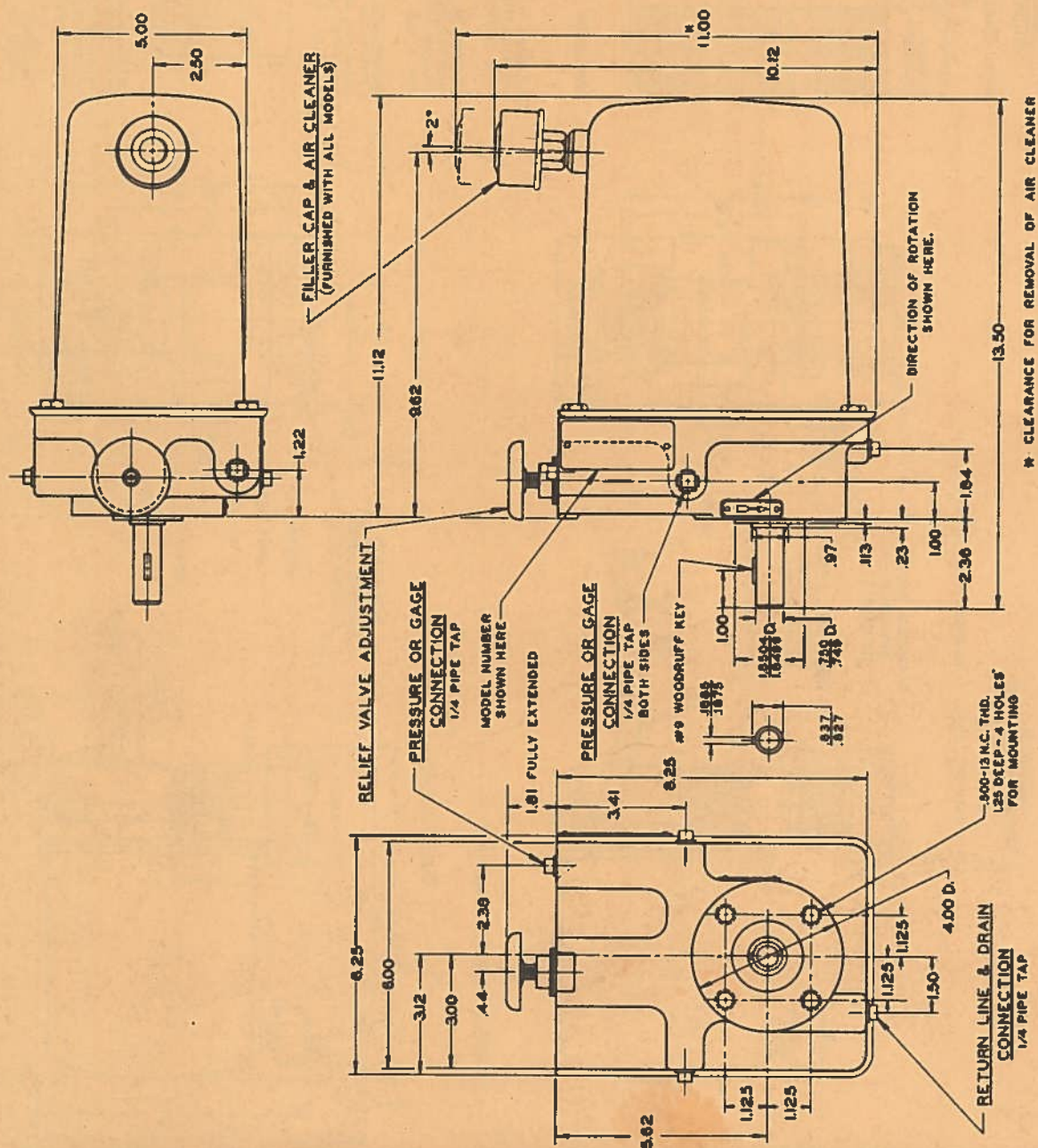
**DRIVE DATA**

H.P. INPUT AT OTHER DRIVING SPEEDS AND WORKING PRESSURE DELIVERY IS APPROXIMATELY PROPORTIONAL TO R.P.M. AND PRESSURE.

DIRECTION OF DRIVE SHAFT ROTATION OF MODELS TABULATED  
IS RIGHT HAND VIEWING DRIVE SHAFT END. LEFT HAND ROTATION  
MUST BE SPECIFIED BY ADDING SUFFIX "L.H." TO MODEL NUMBER.  
EXAMPLE: PK8-1000-0-L.H.

RELIEF VALVE ADJUSTMENT-----75 TO 1000 P.S.I.

TANK CAPACITY - SERIES PH6 - ONE GALLON = (APPROXIMATELY 3 PINTS USEABLE)



REVISED 1-3-78

500200



## GENERAL DATA

THIS UNIT IS OF THE AXIAL PISTON, VARIABLE DISPLACEMENT, INLINE DESIGN RATED AT 90 GPM AT 1800 RPM AND 1500 PSI. DISPLACEMENT IS CONTROLLED BY A STEM SERVO CONTROL WHICH OPERATES BOTH SIDES OF CENTER PERMITTING BI-DIRECTIONAL FLOW CHARACTERISTICS. SHAFT ROTATION IS AS TABULATED AND IS NOT REVERSIBLE.

## STEM SERVO CONTROL

USE OF THE STEM SERVO CONTROL PROVIDES ACCURATE CONTROL OF FLOW AND EXTREMELY SMOOTH FLOW REVERSAL WHILE ELIMINATING THE NEED FOR EXTERNAL FLOW, DECELERATION, AND DIRECTIONAL VALVES. THIS CONTROL PROVIDES MECHANICAL OR MANUAL SELECTION OF PUMP DELIVERY FROM ZERO TO MAXIMUM. THE STEM MAY BE MOVED .98 OF AN INCH ON EACH SIDE OF CENTER POSITION TO PERMIT FULL REVERSAL OF FLOW. DELIVERY RATE CHANGES LINEARLY WITH STEM POSITION. TOTAL STEM TRAVEL IS LIMITED TO 1.97 INCHES BY INTERNAL STOPS.

MINIMUM RECOMMENDED STROKING TIME (COMPLETE RANGE)..... .35 SECONDS

IF AUXILIARY PUMP IS NOT USED, PROVIDE 12 GPM AT 1000 PSI PRESSURE CONTROL POWER SOURCE TO OBTAIN MINIMUM RECOMMENDED STROKING TIME.

## INSTALLATION INFORMATION

HORIZONTAL MOUNTING IS RECOMMENDED TO MAINTAIN NECESSARY CASE FLUID LEVEL. THE CASE DRAIN LINE MUST BE FULL SIZE UNRESTRICTED AND CONNECTED FROM THE UPPERMOST DRAIN PORT DIRECTLY TO THE RESERVOIR IN SUCH A MANNER THAT THE HOUSING REMAINS FILLED WITH FLUID. PIPING OF DRAIN LINE MUST PREVENT SIPHONING. PIPE DRAIN LINE SO THAT IT TERMINATES BELOW RESERVOIR FLUID LEVEL. NO OTHER LINES ARE TO BE CONNECTED TO THIS DRAIN LINE. CAUTION MUST BE EXERCISED TO NEVER EXCEED 5 PSI UNIT CASE PRESSURE.

## STARTING

BEFORE STARTING, FILL CASE WITH SYSTEM FLUID THRU UPPERMOST DRAIN PORT. HOUSING MUST BE KEPT FULL AT ALL TIMES TO PROVIDE INTERNAL LUBRICATION.

WHEN FIRST STARTING, IT MAY BE NECESSARY TO BLEED AIR FROM PUMP OUTLET LINE TO PERMIT PRIMING AND REDUCE NOISE. BLEED BY LOOSENING AN OUTLET CONNECTION UNTIL SOLID STREAM OF FLUID APPEARS. AN AIRBLEED VALVE IS AVAILABLE FOR THIS PURPOSE. SEE DRAWING 521601.

TO ASSIST INITIAL PRIMING, CONTROL SETTING MUST BE AT LEAST 40% OF MAXIMUM FLOW POSITION.

## OPERATING SPECIFICATIONS

THEORETICAL DISPLACEMENT (MAXIMUM STROKE)..... 12.04 CU. IN./REV.

## DELIVERY (THEORETICAL)

AT 1800 RPM..... 93.8 GPM

## OPERATING SPEED

RATED..... 1800 RPM  
MAXIMUM..... 1800 RPM

## OPERATING PRESSURE

RATED..... 1500 PSI  
MAXIMUM..... 3000 PSI

INLET PRESSURE (MINIMUM)..... 50 PSI

## INPUT HORSEPOWER (MAXIMUM SPEED AND PRESSURE)

WITHOUT AUXILIARY CONTROL PUMP..... 182 HP  
WITH AUXILIARY CONTROL PUMP..... 186 HP

## DRIVE ROTATION

SHAFT ROTATION IS NOT REVERSIBLE AND MUST BE SPECIFIED WHEN ORDERING.

## FILTRATION

PRESSURE OR RETURN LINE..... 25 MICRONS  
INLET..... 149 MICRONS

## FLUIDS

CLEAN PETROLEUM OIL, MEETING OR EXCEEDING LUBRICATING QUALITIES OF SAE 10W MEETING API SERVICE CLASSIFICATION MS (MAXIMUM SEVERITY) IS RECOMMENDED. VISCOSITY RANGE IS 150-225 SUS AT 100° F. FOR HYDRAULIC OIL REQUIREMENTS REFER TO DATA SHEET I-286-S.

## FLANGES

BOTH INLET AND OUTLET PORTS ACCEPT VICKERS' FL1-20-20P-10 OR FL1-20-20W-10 SAE 4-BOLT FLANGES; DATA ON DRAWING I-250700.

WEIGHT (APPROXIMATE)..... 228 LBS.

THIS UNIT IS DESIGNED TO MEET SPECIFICATIONS AS OUTLINED. TO INSURE MAXIMUM UNIT PERFORMANCE IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION, CONSULT YOUR VICKERS APPLICATION ENGINEER IF YOUR:

APPLICATION REQUIRES AN INDIRECT DRIVE

MOUNTING ATTITUDE IS OTHER THAN HORIZONTAL

NEEDS REQUIRE APPLICATION ASSISTANCE



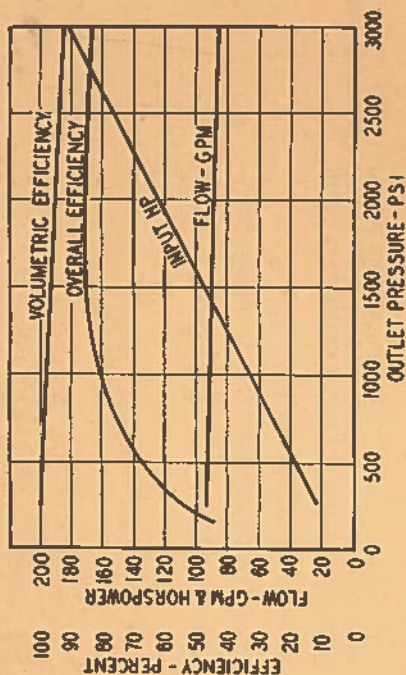
**MODEL CODE**

P	V	B	90	-	(F)	*	D	F	-	21	-	D	(A)	-	11
<p>CONTROL DESIGN NUMBERS SUBJECT TO CHANGE. INSTALLATION DIMENSIONS REMAIN AS SHOWN FOR DESIGN NUMBERS 10 THROUGH 19.</p> <p>OPTIONS A-CONTROL PUMP (OMIT WHEN NOT INCLUDED)</p> <p>CONTROL STEM SERVO CONTROL</p> <p>PUMP DESIGN NUMBER SUBJECT TO CHANGE. INSTALLATION DIMENSIONS REMAIN AS SHOWN FOR DESIGN NUMBERS 20 THROUGH 29.</p> <p>PORT CONNECTIONS F - SAE 4 BOLT FLANGES</p> <p>SWASH PLATE MOVEMENT D - BOTH SIDES OF CENTER</p> <p>ROTATION (VIEWING SHAFT END) R - RIGHT HAND L - LEFT HAND</p> <p>MOUNTING TYPE F - FOOT BRACKET OMIT FOR FLANGE OR INTEGRAL FOOT MTG.</p> <p>GPM RATING @ 1800 RPM</p> <p>INLINE PISTON UNIT SERIES</p> <p>VARIABLE DISPLACEMENT</p> <p>PUMP</p>															

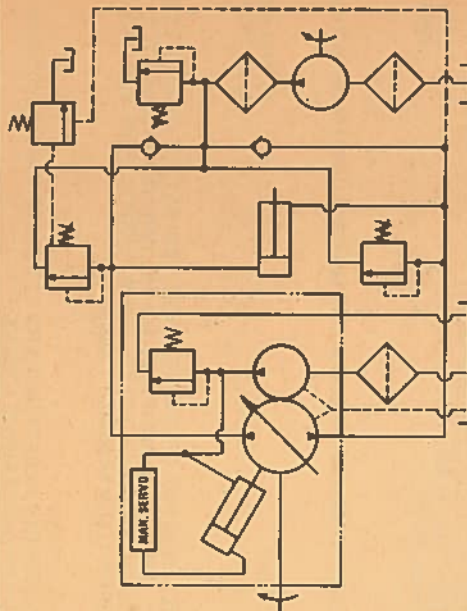
**TYPICAL PERFORMANCE CURVES**

PERFORMANCE CHARACTERISTICS WITHOUT AUXILIARY CONTROL PUMP  
(ADD 4 HP TO INPUT FOR CONTROL PUMP)  
BASED ON OIL TEMPERATURE OF 120° F. (115 SUS)

INPUT SPEED - 1800 RPM      INLET PRESSURE - 50 PSI



**TYPICAL  
CIRCUIT  
DIAGRAM**



WHEN USING A STEM SERVO CONTROLLED PUMP FOR REVERSING FLOW, THE PUMP INLET MUST BE KEPT SUPERCHARGED TO ABOUT 50-75 PSI. THE SYSTEM ILLUSTRATED SHOWS AN UNBALANCED CYLINDER WHEREIN THE EXTERNAL SUPERCHARGE PUMP CAPACITY IS SUFFICIENT TO MAKE UP LEAKAGE IN THE MAIN CIRCUIT PLUS THE DIFFERENCE IN VOLUME BETWEEN THE HEAD AND ROD ENDS OF THE CYLINDER CIRCUIT. CONTROL IS ACCOMPLISHED BY THE MOVEMENT OF THE PUMP STEM. FOR HYDRAULIC MOTORS OR DOUBLE-ENDED CYLINDERS THE UNLOADING VALVE IS NOT REQUIRED AND THE SUPERCHARGE PUMP CAPACITY NEED ONLY BE SUFFICIENT TO MAKE UP LEAKAGE.



# **SPERRY VICKERS VARIABLE DISPLACEMENT INLINE PISTON PUMP**

MODEL SERIES PVB90-\*\*\*F-30-RA\*20

ELECTRO-HYDRAULIC SERVO CONTROL WITH INTEGRAL CONTROL PUMP

SINGLE SIDE OR ACROSS CENTER FOOT OR FLANGE MOUNTING

PORT A AND PORT B FACE

500-13 UNC-2B THD.  
1.12 DEEP - 3 HOLES  
FOR EYEBOLTS

SERVO VALVE  
MOUNTING SCREWS  
AND NUTS ADJUSTING  
SCREW UNDER  
NAMEPLATE  
COVER

MODEL NUMBER SHOWN HERE

1.749 D ± .001

2.50

4.50

6.62

13.88

18.81

7.91

5.65

1.00

3.19

.50

1.50

4.38

1.940

± .005

5.999 D ± .001

7.5 R. - 4 PLACES

.625-11 UNC-2B THD.

1.12 DEEP - 4 MTG. HOLES

(WHEN NOT USING FOOT

BRACKET)

CASE DRAIN

(ALTERNATE) - SEE ABOVE

1.68

4.313

5.125

1.75

.88

1.75

18.05 "RA"

8.500

6.88

12.53

15.62

18.29

19.20 "RAA"

18.29

SERVO VALVE  
ELEC.  
OUTLET  
1/2 NPT  
THD.

CONTROL VANE PUMP  
COVER "RA" MODEL

500-13 UNC-2B THD.  
1.19 DEEP - 8 HOLES  
CONNECTIONS - 250 BOLTED  
FLANGE CONNECTIONS

15.31

5.31

2.44

2.75

4.06

17.50

3.500

5.500

7.50

1.750

4.281

6.50

8.62

2.000

1.000

4.281

7.75

6.50

8.62

15.500

17.25

4.188

8.375

7.750

8.62

15.500

17.25

4.188

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8.375

7.750

8.62

15.500

17.25

4.188



GENERAL DATA

THESE UNITS ARE OF THE AXIAL PISTON, VARIABLE DISPLACEMENT INLINE DESIGN. DISPLACEMENT BETWEEN ZERO AND MAXIMUM RATED CAPACITY IS CONTROLLED BY AN ELECTRO-HYDRAULIC DEVICE THROUGH SUITABLE ELECTRONIC GEAR (NOT FURNISHED). ONE OR TWO WAY PUMPING ACTION IS AVAILABLE.

CONTROL FUNCTION

PUMP FLOW IS PROPORTIONAL TO THE INPUT VOLTAGE TO THE AMPLIFIER FROM A COMMAND POTENTIOMETER. A YOKE POTENTIOMETER PROVIDES ELECTRICAL FEEDBACK TO THE AMPLIFIER. THESE ELECTRONICS CONTROL AN SF4-140-20-002-10 SERVO VALVE WHICH REGULATES THE SUPPLY OF OIL TO THE LARGE CONTROL PISTON ACTUATING THE PUMP YOKE. A 10 MICRON FILTER IS INCLUDED IN THE CONTROL SYSTEM. AN INTEGRAL AUXILIARY PUMP PROVIDES THE HYDRAULIC POWER FOR THIS SERVO CONTROL.

ADDITIONAL SPECIFICATIONS ON THE SF4 SERIES SERVO VALVE USED ON THIS CONTROL CAN BE OBTAINED FROM INSTALLATION DRAWING 501170.

INSTALLATION INFORMATION

HORIZONTAL MOUNTING IS RECOMMENDED TO MAINTAIN NECESSARY CASE FLUID LEVEL. THE CASE DRAIN LINE MUST BE FULL SIZE UNRESTRICTED AND CONNECTED FROM THE UPPERMOST DRAIN PORT DIRECTLY TO THE RESERVOIR IN SUCH A MANNER THAT THE HOUSING REMAINS FILLED WITH FLUID. PIPING OF DRAIN LINE MUST PREVENT SIPHONING. PIPE DRAIN LINE SO THAT IT TERMINATES BELOW RESERVOIR FLUID LEVEL. NO OTHER LINES ARE TO BE CONNECTED TO THIS DRAIN LINE. CAUTION MUST BE EXERCISED TO NEVER EXCEED 5 PSI UNIT CASE PRESSURE.

STARTING

BEFORE STARTING, FILL CASE WITH SYSTEM FLUID THRU UPPERMOST DRAIN PORT. HOUSING MUST BE KEPT FULL AT ALL TIMES TO PROVIDE INTERNAL LUBRICATION.

WHEN FIRST STARTING, IT MAY BE NECESSARY TO BLEED AIR FROM PUMP OUTLET LINE TO PERMIT PRIMING AND REDUCE NOISE. BLEED BY LOOSENING AN OUTLET CONNECTION UNTIL SOLID STREAM OF FLUID APPEARS. AN AIRBLEED VALVE IS AVAILABLE FOR THIS PURPOSE. SEE DRAWING 521601.

TO ASSIST INITIAL PRIMING, CONTROL SETTING MUST BE AT LEAST 40% OF MAXIMUM FLOW POSITION.

OPERATING SPECIFICATIONS

THEORETICAL DISPLACEMENT.....12.04 CU. IN./REV.

DELIVERY.....SEE CURVE ON FOLLOWING PAGE.

OPERATING SPEED

MAXIMUM.....1800 RPM

OPERATING PRESSURE

MAXIMUM.....3000 PSI

INLET PRESSURE (100 SUS OIL)

ACROSS CENTER MODEL (MIN.).....75 PSI  
SINGLE SIDE OF CENTER MODEL.....SEE CURVE

DRIVE ROTATION

SHAFT ROTATION IS NOT REVERSIBLE AND MUST BE SPECIFIED WHEN ORDERING. FLOW DIRECTION IS CONTROLLED ELECTRICALLY.

FILTRATION

PRESSURE OR RETURN LINE.....25 MICRONS

FLUIDS

REFER TO DATA SHEET I-286-S (SECTION L) FOR HYDRAULIC OIL RECOMMENDATIONS.

FLANGES

BOTH INLET AND OUTLET PORTS ACCEPT VICKERS' FL1-20-20W-10 SAE 4-BOLT FLANGES; DATA ON DRAWING I-250700.

WEIGHT LBS. (APPROXIMATE).....260

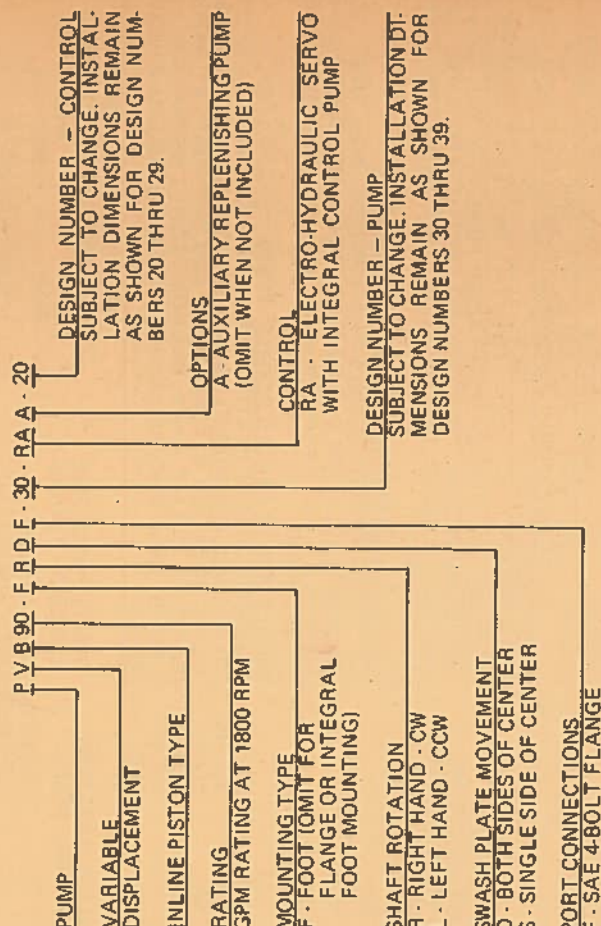
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APPLICATION REQUIRES AN INDIRECT DRIVE

MOUNTING ATTITUDE IS OTHER THAN HORIZONTAL

NEEDS REQUIRE APPLICATION ASSISTANCE

TYPICAL MODEL CODE

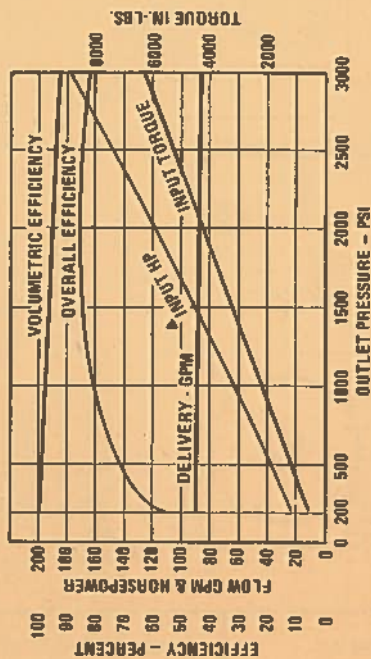




## TYPICAL PERFORMANCE CURVES

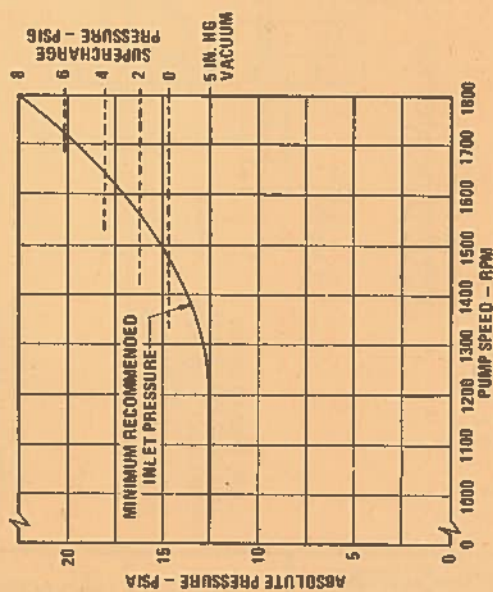
### PERFORMANCE CHARACTERISTICS

INPUT SPEED - 1800 RPM INLET PRESSURE - 75 PSI  
 ▲ INPUT HP INCLUDING CONTROL PUMP  
 PLUS REPLENISHING PUMP AT 100 PSI  
 BASED ON OIL TEMPERATURE OF 120° F. (115 SUS)



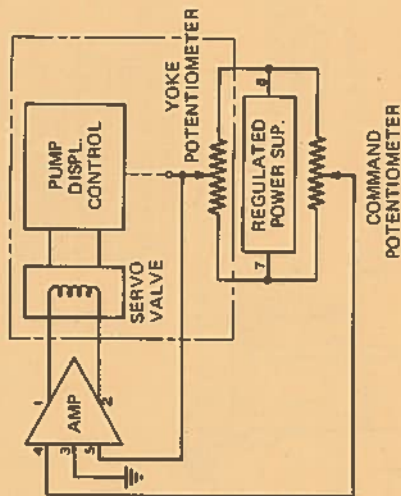
### ▲ INLET PRESSURE CURVE

MINIMUM PRESSURE AT THE  
 PUMP INLET CONNECTION  
 BASED ON OIL TEMPERATURE OF 120° F.  
 (100 SUS) VISCOSITY OF 150 SUS @ 100° F.



▲ MODELS PVB90-\*\*SF-30-RA-20

## ELECTRICAL DIAGRAM

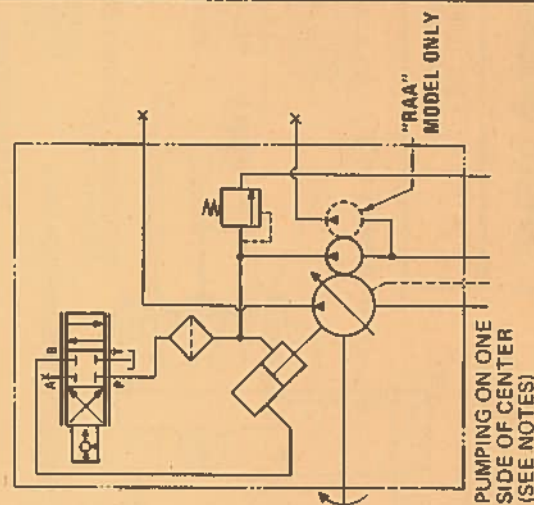


## ELECTRICAL SPECIFICATIONS

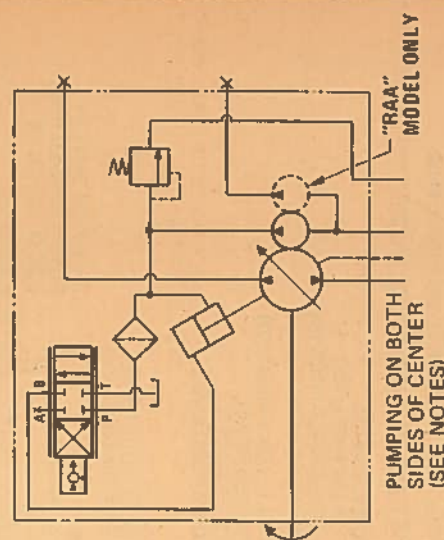
SERVO VALVE INPUT	0-400 MA
OPERATING CURRENT	200 MA
NOMINAL NULL CURRENT	3.2 WATTS
POWER REQUIRED	20 OHMS
NOMINAL COIL RESISTANCE	50-60 HZ
DITHER REQUIRED FOR OPTIMUM PERFORMANCE	
YOKE POTENTIOMETER	
RESISTANCE	5000 OHMS
RESISTANCE TOLERANCE	±10%
POWER DISSIPATION	.3 WATTS
CONSULT YOUR VICKERS APPLICATION ENGINEER TO SUIT YOUR INDIVIDUAL SERVO AMPLIFIER NEEDS.	
SUGGESTED SHIELDED HOOK-UP WIRE	
YOKE POTENTIOMETER TO CONTROL PANEL BELDEN NO. 8971 OR EQUIVALENT 3 WIRE NO. 18 GAGE.	
SHIFT TIME (SECONDS APPROX.)	1200 RPM 1800 RPM
FULL TO FULL STROKE	.40 .31
ZERO TO FULL	.18 .14
FULL TO ZERO	.17 .14

## TYPICAL PUMP DIAGRAMS

MODELS PVB90-\*\*SF-30-RAA-20



MODELS PVB90-\*\*DF-30-RA-20



509025-2



**SPERRY VICKERS**  
TROY, MICHIGAN 48084

VARIABLE DISPLACEMENT  
PISTON PUMP

90 GPM AT  
3000 PSI

SOLENOID STEP  
CONTROL

DWG. NO.  
509030

# VARIABLE DISPLACEMENT INLINE PISTON PUMP

**SPERRY VICKERS**

MODEL SERIES PV890-F\*DF-3\*SA\*3\*

ELECTRIC STEP CONTROL WITH INTEGRAL CONTROL PUMP

.5000-13 UNC-2B THD.  
1.12 DEEP - 3 HOLES  
FOR EYEBOLTS

DIRECTION OF ROTATION  
SHOWN HERE

PORT A AND B FACE

2 LEAD WIRES FOR EACH COIL  
APPROXIMATELY 6 INCHES LONG  
WITH NO. 8 SIZE TERMINALS PROVIDED  
FOR CUSTOMER CONNECTION

PERCENT OF FULL YOKE POSITION  
READ OVER THIS SURFACE  
TIGHTEN JAM NUT AFTER  
ADJUSTING YOKE POSITION

CASE DRAIN CONN.  
1.3125-12 UN-2B SAE  
STRAIGHT THD. FOR  
1" O.D. TUBING  
(CONNECT TO TANK  
- SEE NOTES)

ELECTRICAL CONDUIT CONN.  
1/2 NPTF THD.

SOLENOID DATA  
(SEE CHART)

CORRESPONDS  
WITH PORTS "A" & "B"

MODEL NUMBER SHOWN HERE

INLET OR OUTLET  
PUMP CONNECTIONS  
2.38 D. - 2 HOLES

SHAFT ROTATION  
FOR R.H. MODEL

.812 D. - 4 HOLES  
EQUALLY SPACED  
(FOR FLANGE TYPE MOUNTING)

TO ADJUST SPRING CENTERED  
POSITION, REMOVE PLUG  
AND TURN SOCKET HEAD  
SCREW AS REQUIRED.  
SEE INSTRUCTIONS

.5000-13 UNC-2B THD.  
1.19 DEEP - 8 HOLES

437 SQ. KEY  
.062 x .450

8.000 D. ± .0005

75 R. 4 PLACES

.6250-11 UNC-2B THD.  
1.12 DEEP - 4 MTG. HOLES  
(WHEN NOT USING FOOT BRACKET)

CASE DRAIN  
(ALTERNATE) - SEE GENERAL  
DATA INST. NOTE

REPLENISHING VANE PUMP  
DISCHARGE PORT (8.2 GPM  
@ 1800 RPM, 100 PSI)  
.8750-14 UNF-2B SAE  
STRAIGHT THD. FOR  
.625 O.D. TUBING.  
CUSTOMER TO PROVIDE  
RELIEF VALVE.

VANE PUMP INLET PORT  
1.6250-12 UN-2B SAE  
STRAIGHT THD. FOR  
1.250 O.D. TUBING

CONTROL PRESSURE RELIEF VALVE DISCHARGE PORT  
.7500-16 UNF-2B SAE STRAIGHT THD. FOR .500 O.D. TUBING  
MUST BE CONNECTED TO TANK BEFORE OPERATING PUMP

CONTROL VANE  
PUMP COVER  
"SA" MODEL

VALVE "L"  
VALVE "R"

PORT "A"

PORT "B"

5.500

7.500

15.500

17.25

8.375

7.750

8.62

4.188

4.281

4.281

8.50

6.50

2.500

2.000

1.000

3.500

1.750

2.77 MAX.

4.06

2.44

2.75

7.60

.780

1.19

MIN.

5.656

1.00

3.19

.50

450

1.75

6.000

5.998 D.

1.940

± .0005

4.38

4.313

2.12

6.88

5.125

8.500

15.62

12.53

18.29

18.05 "SA"

19.20 "SAA"

.6562 D. - 4 HOLES  
(WHEN USING  
FOOT BRACKET  
MOUNTING)

RELEASED 1-2-76

509030



## GENERAL DATA

THIS UNIT IS OF THE AXIAL PISTON, VARIABLE DISPLACEMENT, INLINE DESIGN RATED AT 90 GPM (NOMINAL) AT 1800 RPM. DISPLACEMENT IS CONTROLLED BY A STEP CONTROL WHICH OPERATES BOTH SIDES OF CENTER PERMITTING BIDIRECTIONAL FLOW CHARACTERISTICS. SHAFT ROTATION IS AS TABULATED AND IS NOT REVERSIBLE. A RELIEF VALVE IS REQUIRED.

## CONTROL FUNCTION

THE ELECTRIC STEP CONTROL PROVIDES FOUR ELECTRICALLY SELECTED FLOW POSITIONS WHICH ARE INFINITELY ADJUSTABLE THROUGHOUT THE ENTIRE FLOW RANGE OF THE PUMP. THE FOUR POSITIONS ARE OBTAINABLE ON EITHER SIDE OF CENTER IN DIFFERENT COMBINATIONS, SUCH AS ALL FOUR POSITIONS ON ONE SIDE, THREE ON ONE SIDE AND ONE ON THE OTHER SIDE, TWO ON ONE SIDE AND TWO ON THE OTHER SIDE. IN ADDITION, A FIFTH POSITION MAY BE OBTAINED BY ADJUSTING THE CENTERING SCREW OFF-CENTER FOR FLOWS UP TO 10% ON EITHER SIDE OF THE CENTER POSITION.

## CONTROL MECHANISM

BASICALLY, THE CONTROL IS A STEM-SERVO TYPE OF CONTROL. THE SERVO-STEM IS ACTUATED BY SMALL SINGLE ACTING HYDRAULIC CYLINDERS WHICH IN TURN ARE CONTROLLED BY TWO DG4V DIRECTIONAL VALVES. EACH VALVE CONTROLS TWO CYLINDERS. THE STROKE OF THE CYLINDERS IS ADJUSTABLE TO PROVIDE A PRE-SELECTED POSITION TO WHICH THE PUMP YOKE CAN BE MOVED. THE CYLINDERS AND CONTROL VALVES ARE LABELED FOR PROPER IDENTIFICATION OF THE CYLINDER AND ITS RESPECTIVE CONTROL VALVE AND PORT. FOR EXAMPLE, WHEN SOLENOID "A" OF "VALVE L" IS ENERGIZED, FLOW IS DIRECTED TO PORT "B" TO ACTUATE CYLINDER "L-B", OR WHEN SOLENOID "A" OF "VALVE R" IS ENERGIZED, FLOW IS DIRECTED TO PORT "B" TO ACTUATE CYLINDER "R-B".

THE ADJUSTOR INDICATOR IS CALIBRATED TO THE APPROXIMATE PERCENTAGE OF FULL FLOW; i.e., 2-20%, 5-50%, ETC. TO SET THE PUMP FLOW, THE LOCK NUT IS LOOSENED AND THE ADJUSTING SCREW IS SET AT THE DESIRED FLOW AND THEN SECURED IN POSITION WITH THE LOCK NUT.

THE CENTERING SPRING RETURNS YOKE TO CENTER POSITION WHEN ALL SOLENOIDS ARE DE-ENERGIZED, OR IF POWER FAILS. THIS POSITION CAN BE ADJUSTED FOR CENTER OR ZERO FLOW, OR FOR FLOWS UP TO  $\pm 10\%$ .

NOTE: ANY SLIDING SPOOL VALVE, IF HELD SHIFTED UNDER PRESSURE FOR LONG PERIODS OF TIME, MAY STICK AND NOT SPRING RETURN DUE TO FLUID RESIDUE FORMATION, AND, THEREFORE, SHOULD BE CYCLED PERIODICALLY TO PREVENT THIS FROM HAPPENING.

SOLENOID DATA	115/120 V ac 60 Hz - 170 V ac 50 Hz
INRUSH amps (R.M.S.)	2.0
HOLDING amps	.4

●● MAXIMUM PEAK INRUSH amps APPROXIMATELY 1.4 X R.M.S. VALUE SHOWN.

## INSTALLATION INFORMATION

HORIZONTAL MOUNTING IS RECOMMENDED TO MAINTAIN NECESSARY CASE FLUID LEVEL. THE CASE DRAIN LINE MUST BE FULL SIZE UNRESTRICTED AND CONNECTED FROM THE UPPERMOST DRAIN PORT DIRECTLY TO THE RESERVOIR IN SUCH A MANNER THAT THE HOUSING REMAINS FILLED WITH FLUID. PIPING OF DRAIN LINE MUST PREVENT SIPHONING. PIPE DRAIN LINE SO THAT IT TERMINATES BELOW RESERVOIR FLUID LEVEL. NO OTHER LINES ARE TO BE CONNECTED TO THIS DRAIN LINE. CAUTION MUST BE EXERCISED TO NEVER EXCEED 5 PSI UNIT CASE PRESSURE.

## STARTING

BEFORE STARTING, FILL CASE WITH SYSTEM FLUID THRU UPPERMOST DRAIN PORT. HOUSING MUST BE KEPT FULL AT ALL TIMES TO PROVIDE INTERNAL LUBRICATION.

WHEN FIRST STARTING, IT MAY BE NECESSARY TO BLEED AIR FROM PUMP OUTLET LINE TO PERMIT PRIMING AND REDUCE NOISE. BLEED BY LOOSENING AN OUTLET CONNECTION UNTIL SOLID STREAM OF FLUID APPEARS. AN AIR- BLEED VALVE IS AVAILABLE FOR THIS PURPOSE. SEE DRAWING 521601.

TO ASSIST INITIAL PRIMING, CONTROL SETTING MUST BE AT LEAST 40% OF MAXIMUM FLOW POSITION.

## OPERATING SPECIFICATIONS

THEORETICAL DISPLACEMENT..... 12.04 CU. IN./REV.

DELIVERY (NOMINAL) - SEE CURVE ON PAGE 2.

## OPERATING SPEED

MAXIMUM..... 1800 RPM

## OPERATING PRESSURE

MAXIMUM..... 3000 PSI

## INLET PRESSURE (MINIMUM)

..... 50 PSI

## DRIVE ROTATION

SHAFT ROTATION IS NOT REVERSIBLE AND MUST BE SPECIFIED WHEN ORDERING. FLOW DIRECTION IS CONTROLLED ELECTRICALLY.

## FILTRATION

PRESSURE OR RETURN LINE..... 25 MICRONS

## FLUIDS

REFER TO PVB FLUID/LIFE CHART AND DATA SHEET I-286-S (SECTION L) FOR HYDRAULIC FLUID AND TEMPERATURE RECOMMENDATIONS.

## FLANGES

BOTH INLET AND OUTLET PORTS ACCEPT SPERRY VICKERS FL1-20-20P-10 OR FL1-20-20W-10 SAE 4-BOLT FLANGES; DATA ON DRAWING I-250700.

WEIGHT LBS. (APPROX.)..... 270

THIS UNIT IS DESIGNED TO MEET SPECIFICATIONS AS OUTLINED, TO INSURE MAXIMUM UNIT PERFORMANCE IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION, CONSULT YOUR SPERRY VICKERS APPLICATION ENGINEER IF YOUR:

APPLICATION REQUIRES AN INDIRECT DRIVE

FLUID DOES NOT MEET I-286-S REQUIREMENTS

NEEDS REQUIRE APPLICATION ASSISTANCE

## ● CONTROL SHIFT TIME

## FUNCTION

	SHIFT TIME (SECONDS - APPROX.)
	1200 RPM 1800 RPM
FULL TO FULL STROKE	.40 EST .36 EST
ZERO TO FULL STROKE	.19 .14
FULL TO ZERO STROKE	.19 .20



# TYPICAL MODEL CODE

P V B 90 - F R D F - 3 - SA A - 3 -

## PUMP

VARIABLE  
DISPLACEMENT

INLINE PISTON  
UNIT SERIES

GPM RATING  
AT 1800 RPM

## MOUNTING TYPE

F - FOOT BRACKET  
OMIT FOR FLANGE MOUNTING

SHAFT ROTATION (VIEWING  
SHAFT END)

R - RIGHT HAND - CW  
L - LEFT HAND - CCW

SWASH PLATE MOVEMENT  
D - BOTH SIDES OF CENTER

DESIGN NUMBER - CONTROL  
SUBJECT TO CHANGE. INSTALLATION  
DIMENSIONS REMAIN  
AS SHOWN FOR DESIGN NUM-  
BERS 30 THRU 39

## OPTIONS

A - AUXILIARY REPLENISHING  
PUMP (OMIT WHEN NOT INCLUDED)

## CONTROL

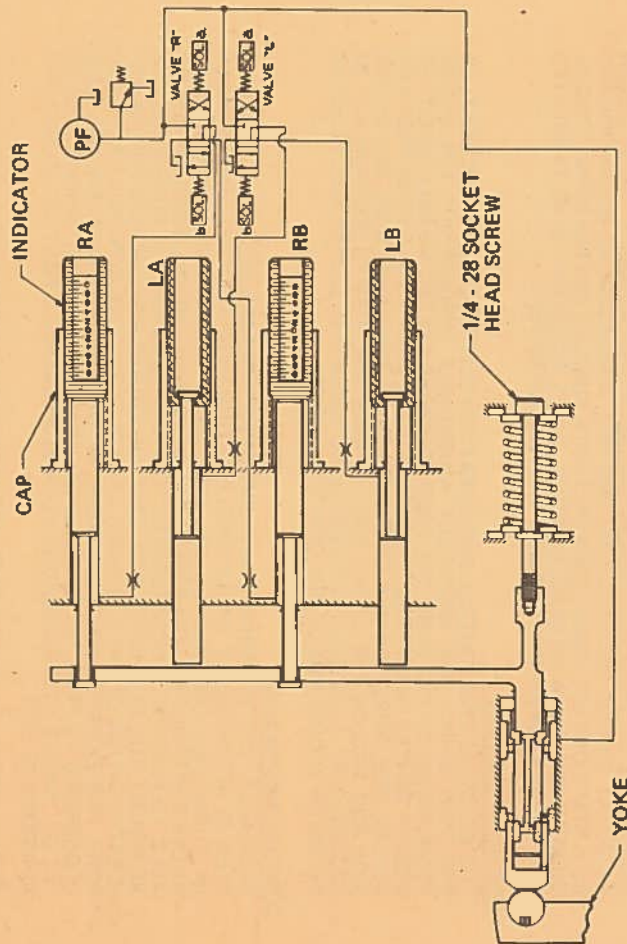
SA - ELECTRIC STEP CONTROL WITH  
INTEGRAL CONTROL PUMP

## DESIGN NUMBER - PUMP

SUBJECT TO CHANGE. INSTALLATION DI-  
MENSIONS REMAIN AS SHOWN FOR  
DESIGN NUMBERS 30 THRU 39.

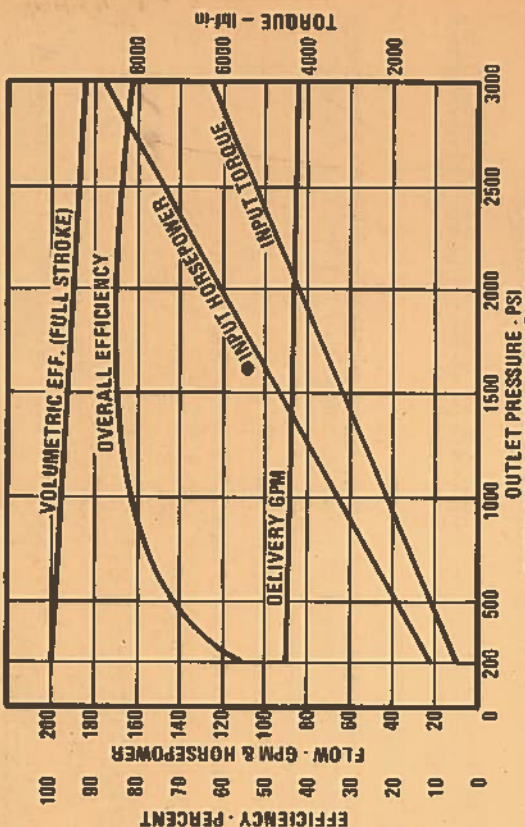
PORT CONNECTIONS  
F - SAE 4-BOLT FLANGE

# SIMPLIFIED SCHEMATIC "S" CONTROL



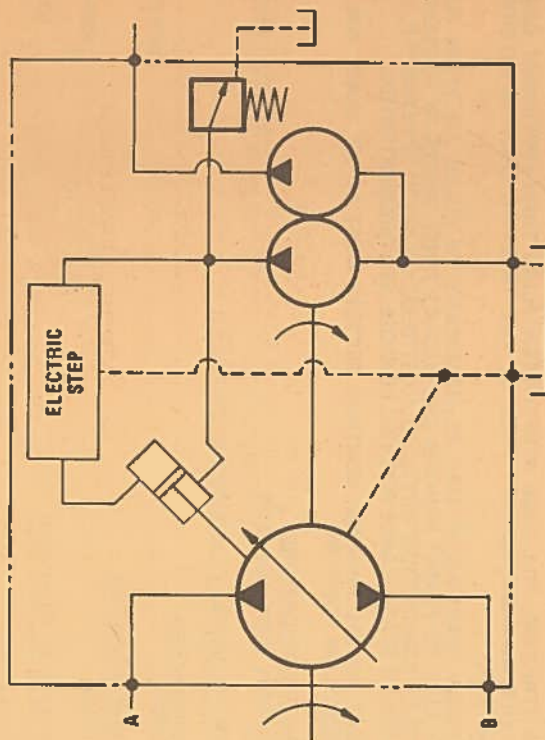
# PERFORMANCE CHARACTERISTICS

INPUT SPEED - 1800 RPM  
INLET PRESSURE - 50 PSI



● INPUT HP INCLUDES CONTROL PUMP  
PLUS REPLENISHING PUMP AT 100 PSI

# CIRCUIT DIAGRAM





## INSTRUCTIONS FOR TYPICAL FLOW CYCLE

### GENERAL INSTRUCTIONS:

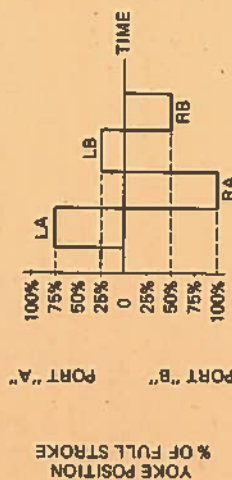
ASSUME THAT THE DESIRED MACHINE CYCLE IS AS SHOWN ON THE DIAGRAMS. DUE TO INHERENT MANUFACTURING TOLERANCES, THE FLOW SCALE IS ACCURATE ONLY TO WITHIN ABOUT  $\pm 2\%$ . FOR GREATER ACCURACY, A FLOW METER MUST BE USED IN THE OUTLET LINE WITH THE OUTLET PRESSURE SET AT THE DESIRED OPERATING PRESSURE. WHEN USING A FLOWMETER IN THE OUTLET LINE, ENERGIZE THE RESPECTIVE SOLENOID FOR THE POSITION BEING ADJUSTED. THE FLOW WILL VARY DIRECTLY AS THE ADJUSTOR SCREW IS TURNED. FOR THE EXAMPLES SHOWN, PUMP ROTATION IS CW. PORTS "A" AND "B" ARE REVERSED FOR CCW ROTATION OF THE PUMP. TIGHTEN JAM NUTS AFTER ADJUSTMENT IS COMPLETE.

**NOTE:** (1) WHEN THE CENTERING SPRING CHAMBER PLUG IS REMOVED, OIL WILL DRAIN FROM THE SPRING CHAMBER.

(2) FOR THE POSITION SHOWN ON THE DIAGRAMS, ZERO OUTLET PRESSURE IS ASSUMED. TO CORRECT FOR SLIPPAGE AT HIGHER PRESSURES, ADD THE PERCENTAGE REDUCTION IN VOLUMETRIC EFFICIENCY TO THE DESIRED YOKE POSITION. FOR EXAMPLE, IF THE DESIRED YOKE POSITION IS 50%, AND THE VOLUMETRIC EFFICIENCY IS 97%, SET THE ADJUSTOR AT 53%.

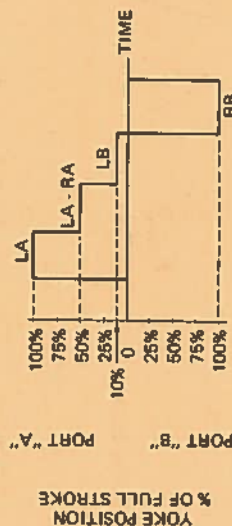
**CAUTION:** SOLENOIDS LA AND LB MUST NEVER BE ENERGIZED SIMULTANEOUSLY. LIKEWISE, SOLENOIDS RA AND RB MUST NOT BE ENERGIZED SIMULTANEOUSLY. NONCOMPLIANCE WITH THE ABOVE WILL RESULT IN FAILURE OF THE SOLENOIDS.

TYPICAL EXAMPLE NO. 1



1. DE-ENERGIZE ALL SOLENOIDS. REMOVE PLUG BEHIND CENTERING SPRING. ADJUST ONE QUARTER INCH DIAMETER SOCKET HEAD SCREW UNTIL ZERO PRESSURE IS OBTAINED ON PORTS "A" AND "B". REPLACE PLUG.
2. TURN ADJUSTOR SCREW LA CW FROM ZERO MARK UNTIL THE 75% MARK ON THE SCALE ALIGNS WITH TOP OF CAP.
3. TURN ADJUSTOR SCREW RA CCW FROM ZERO MARK UNTIL THE 100% MARK ON THE SCALE ALIGNS WITH THE TOP OF CAP.
4. TURN ADJUSTOR SCREW LB CW FROM ZERO MARK UNTIL THE 25% MARK ON THE SCALE ALIGNS WITH THE TOP OF CAP.
5. TURN ADJUSTOR SCREW RB CCW FROM ZERO MARK UNTIL THE 50% MARK ON THE SCALE ALIGNS WITH THE TOP OF CAP.

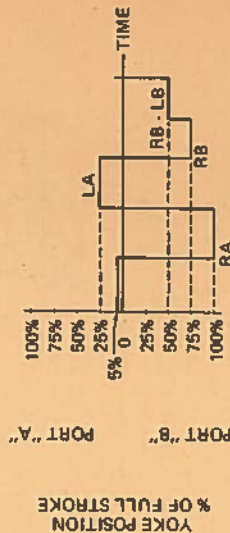
TYPICAL EXAMPLE NO. 2



1. ADJUST SPRING CENTERED POSITION AS IN ITEM 1 OF EXAMPLE 1.
2. TURN ADJUSTOR SCREW LA CW FROM ZERO MARK UNTIL THE 100% MARK ON THE SCALE ALIGNS WITH THE TOP OF THE CAP.
3. TURN ADJUSTOR SCREW RA CW FROM ZERO MARK UNTIL THE 50% MARK ON THE SCALE ALIGNS WITH THE TOP OF THE CAP.
4. TURN ADJUSTOR SCREW LB CW FROM ZERO MARK UNTIL THE 10% MARK ON THE SCALE ALIGNS WITH THE TOP OF THE CAP.
5. TURN ADJUSTOR SCREW RB CCW FROM ZERO MARK UNTIL THE 100% MARK ON THE SCALE ALIGNS WITH THE TOP OF THE CAP.

**NOTE:** ENERGIZE SOLENOIDS LA AND RA SIMULTANEOUSLY FOR THE 50% POSITION ON PORT "A" AS INDICATED ON THE CYCLE DIAGRAM. ADJUSTOR SCREW LA MUST BE SET AT GREATER FLOW THAN ADJUSTOR SCREW RA. FOR EXAMPLE, ENERGIZING SOLENOIDS RA AND LB WOULD NOT RESULT IN THE DESIRED FLOW POSITION OF 50%. SOLENOID LB COULD BE USED, HOWEVER, IF THE FLOW POSITION LB WAS GREATER THAN 50%.

TYPICAL EXAMPLE NO. 3



1. TURN CENTERING SPRING SCREW CCW UNTIL 5% OF FULL FLOW IS OBTAINED. A FLOW METER WILL BE NECESSARY TO MEASURE THE OUTLET FLOW.
2. TURN ADJUSTOR SCREW RA CCW FROM THE ZERO MARK UNTIL THE 105% MARK ON THE SCALE ALIGNS WITH THE TOP OF THE CAP. (100% + 5% OFFSET)
3. TURN ADJUSTOR SCREW LA CW FROM THE ZERO MARK UNTIL THE 20% MARK ON THE SCALE ALIGNS WITH THE TOP OF THE CAP. (25% - 5% OFFSET)
4. TURN ADJUSTOR SCREW RB CCW FROM THE ZERO MARK UNTIL THE 80% MARK ON THE SCALE ALIGNS WITH THE TOP OF THE CAP.
5. TURN ADJUSTOR SCREW LB CCW FROM THE ZERO MARK UNTIL THE 55% MARK ON THE SCALE ALIGNS WITH THE TOP OF THE CAP.

**NOTE:** FOR THE 50% FLOW POSITION, SOLENOIDS RB AND LB MUST BE ENERGIZED SIMULTANEOUSLY.





## FLOW CONTROL VALVES FOR SYSTEM PRESSURE TO 3000 PSI

Pressure and temperature compensated to provide precise adjustable flow rates regardless of fluid pressure or temperature changes.

Valve is adjustable over entire flow range to 1500 cu. in. per minute permitting greater flexibility, cutting stocking needs.

Trim adjustment (optional) permits an adjustment of approximately  $\pm 8\%$  of flow setting when valve locking device is in a locked position.

Reverse free flow (15 GPM) from outlet to inlet port.

Tamper-proof adjustment of feed rate assured because set screw adjustment cover can be locked in place.

No external drain required.



## FLOW CONTROL AND OVERLOAD RELIEF VALVES FOR SYSTEM PRESSURE TO 2000 AND 3000 PSI

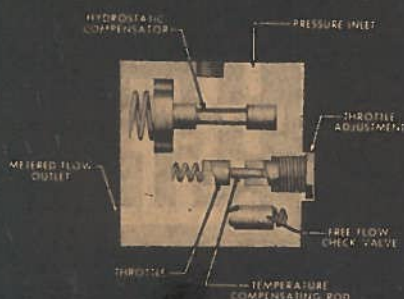
Integral relief valve is independently adjustable, serves to limit maximum operating pressure.

Pressure compensation insures uniform speed control despite fluctuations in pressure resulting from varying loads.

Pump can be completely unloaded by turning control to zero.

Bleed-off takes place at system demand pressure rather than relief valve setting.

New series (FRG-03) offers temperature and pressure compensation; maximum adjustable relief valve pressure capability to 1000, 2000 or 3000 psi; and handles flows to 28 gpm.





# FLOW CONTROLS

Precise volumetric control is possible with Sperry Vickers temperature and pressure compensated flow control valves. Valves are available with or without integral relief valve section and are suitable for pressures up to 3000 psi. Models are available to meet almost any requirement.



# HYDRAULIC MOTORS

When your application needs rotary power, Sperry Vickers has a hydraulic motor to do the job.

Sperry Vickers vane motors are of fixed displacement type and feature exclusive dual-alternate pressure plate arrangement that results in high operating efficiencies. They can be reversed from zero to maximum speed in either direction by reversing the oil flow.

The piston type motors are offered either in fixed or variable displacement type. Exclusive use of powdered metallurgy techniques make it possible for Sperry Vickers to offer these exceptionally high performance motors at competitive prices.



# Hydraulic Motors

## piston type

### design characteristics

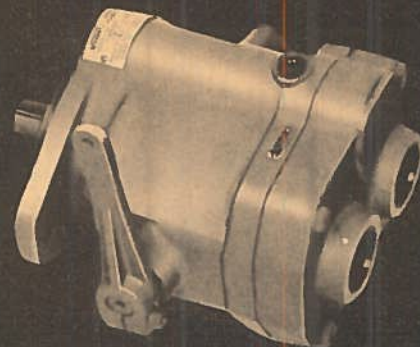
Motors are axial piston, variable or fixed displacement in-line design, and provide power for a wide range of industrial applications. Service may be continuous, intermittent, reversing, or stalled without damage when protected by a relief valve.

### high efficiency

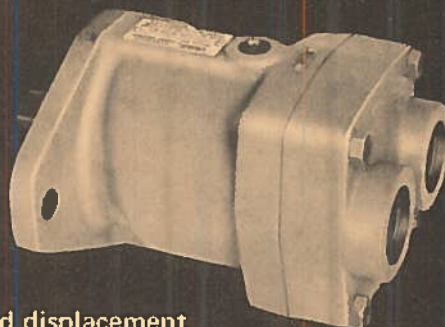
Depending on the specific model selected, over-all operating efficiency can be as high as 95%, volumetric efficiency as high as 99%.

### fixed displacement

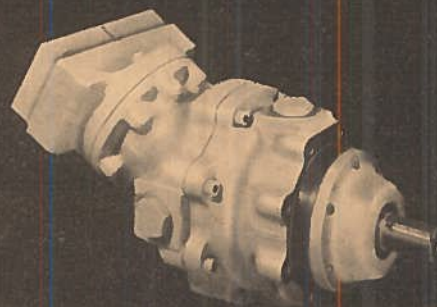
Horsepower output is approximately proportional to speed with a given constant operating pressure. Output speeds are dependent on input flow. Speed ranges of at least 12:1 are possible at maximum torque rating by varying flow to the motor.



variable displacement



fixed displacement

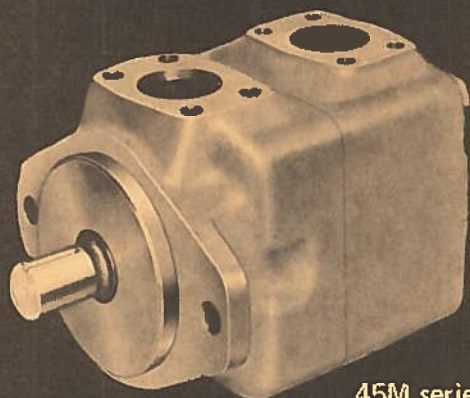


fixed displacement

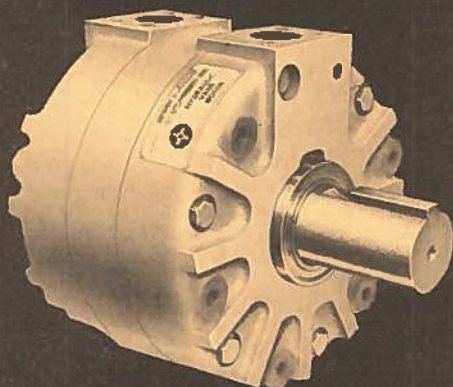


## vane type

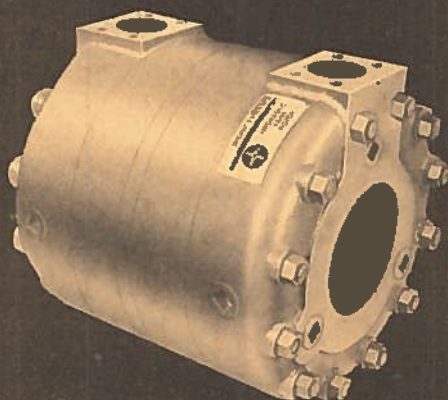
# Hydraulic Motors



45M series



MHT-150



MHT-500 shaftless

### design features

These vane motors automatically maintain optimum running clearances over their complete operating pressure and speed ranges. Inertia of rotating parts is low . . . parts are symmetrical, providing dynamic balance and freedom from vibration. Sperry Vickers "Hydraulic Balance" design eliminates pressure induced bearing loads, a major cause of wear in designs without this feature.

### high torque-low speed

Sperry Vickers high torque-low speed vane motors are capable of smooth motoring speeds (in either direction) throughout their entire pressure and speed range.

Available with torque ratings from 700 to 20,000 lb. ft.

Your choice of either shaft or shaftless models.

In addition to the above, Sperry Vickers has a new series of "Multi-Torque" motors similar to the standard MHT motors. The design of the multi-torque motor permits choosing a number of different speed-and-torque combinations for any given flow and pressure.

These MHT motors can eliminate costly, cumbersome gearboxes and electric motors.



**INDEX**  
**SECTION I - FLUID MOTORS**

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<b>Vane Motors</b>			
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M2-200-S2 straight vane	to 3	520110	i - 3
<b>Vane Motors - High Performance</b>			
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35M	to 10	520150	i - 9
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<b>High Torque - Low Speed Vane Motors</b>			
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MHT50 standard	50	520225	i - 23
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MHT150/130 standard	130 to 150	520240B	i - 32
MHT150/130 multi-torque	55 to 150	520240B	i - 32
MHT250/220/190 standard	190 to 250	520250B	i - 35
MHT250/220/190 multi-torque	95 to 250	520250B	i - 35
MHT500/440/380 standard	380 to 500	520260B	i - 38
MHT500/440/380 multi-torque	190 to 500	520260B	i - 38
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MHT750/690 multi-torque	315 to 750	520270	i - 41
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MFB5-S61 fixed servo type	.85	520302	i - 50
MFB10 fixed	1.7	520305	i - 53
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MFB29 fixed - heavy duty	5	520315	i - 58
MFB45 fixed	7.7	520325	i - 60
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MF2000	to 8	136014	i - 66
MFA50/120/150	to 38	520500	i - 67

**MODEL CODES**

Model codes in this catalog list many options. Some possible model combinations are not readily available. Please contact your Sperry Vickers representative to verify availability.



**SPERRY-VICKERS**  
TROY, MICHIGAN 48084

**HYDRAULIC  
MOTORS**

**FIXED  
DISPLACEMENT**

**VANE  
TYPE**

**5.0 OR 6.2  
HORSEPOWER**

**THREADED  
CONNECTIONS**

**2-BOLT FLANGE  
OR FOOT  
MOUNTING**

**DWG. NO.  
520100**

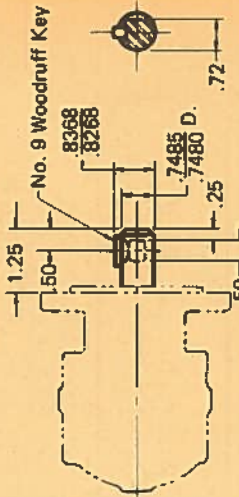
**SPERRY-VICKERS**  
T.M.

# HYDRAULIC VANE MOTORS

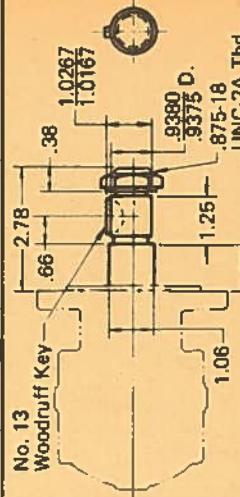
## MODEL SERIES M2-200 FIXED DISPLACEMENT - VANE TYPE

- All Fluid Motors Listed are of Sperry Vickers exclusive "balanced vane type" construction. Operating Characteristics are of the variable horsepower class: Horsepower output being proportional to RPM as long as operating pressure is constant. See curves on reverse side.
- Running Torque: See curves on reverse side.
  - Recommended Normal Operating Pressure for best overall efficiency and life is 800 PSI.
  - Maximum pressure is 1000 PSI for intermittent service such as starting and accelerating loads.
  - Recommended Speed as indicated in tabulation is maximum RPM for normal operating conditions.
  - Normal Minimum Operating Speeds will vary from 50 to 100 RPM depending upon the size of motor and the characteristics of the driven load.

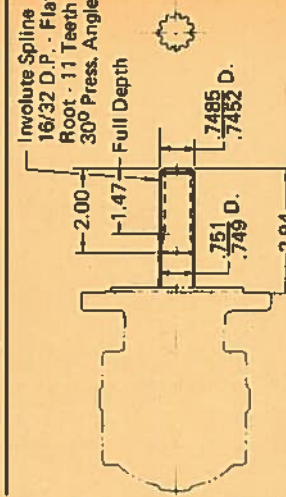
### OPTIONAL SHAFTS



Straight Stub (No. 6) Shaft MODEL M2-21\*-6\*-11

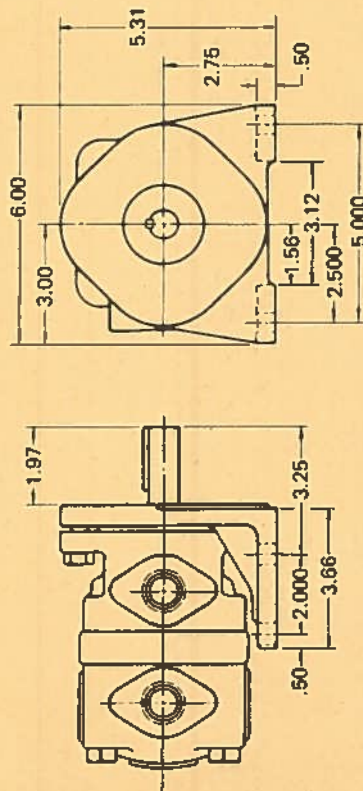


Threaded (No. 3) Shaft MODEL M2-21\*-3\*-11



Splined (No. 11) Shaft MODEL M2-21\*-11\*-11

520100

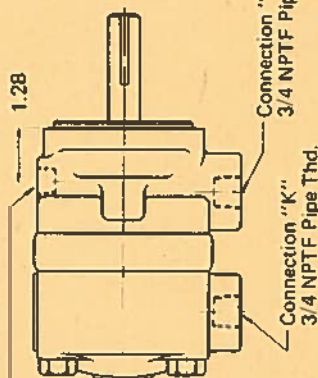


MODEL M2-214\*-1C

### FOOT MOUNTING

(May be assembled in any one of four positions)

Drain Connection  
3/8 NPTF Pipe Thd.  
(See Note)



MODEL M2-210\*-1C

### FLANGE MOUNTING

438 Dia. - 2 Holes For Mounting

3.250 Dia.

3.248 Dia.

1.62

.832

.827

.94

1.88

.91 R.

2.81

2.86

1.47

.50

.38 R.

1.885 Sq. Key

1.875 Sq. Key

.47 R.

5.12 Dia.

4.187

2.094

Connection "K", shown assembled in line with connection "L", is designated by letter "C" in model number.

Optional locations of connection "K"

"A" - Opposite "L"

"B" - 90° Counterclockwise from "L"

"D" - 90° Clockwise from "L"

Clockwise Rotation

10°

10°

Counterclockwise Rotation

3.75

4.38 Dia. - 2 Holes For Mounting

3.250 Dia.

3.248 Dia.

1.62

.832

.827

.94

1.88

.91 R.

2.81

2.86

1.47

.50

.38 R.

1.885 Sq. Key

1.875 Sq. Key

.47 R.

5.12 Dia.

4.187

2.094

Model Numbers		Normal Ratings	
Flange Mounting	Foot Mounting	Speed RPM	Displacement GPM
M2-210-25-1*-11	M2-214-25-1*-11	2200	15.1
M2-210-35-1*-11	M2-214-35-1*-11	1800	17.9

REVISED 12-1-78



**Output Shaft Rotation** can be from "0" to maximum RPM in either direction.

Oil supply to connection "L" turns shaft clockwise.

Oil supply to connection "K" turns shaft counterclockwise.

**Service** may be reversing or stalled, under load, without damage to fluid motor. A relief valve is required. May be used where variable speeds are desired.

**Type of Drive:** Direct drive thru flexible coupling is recommended but belt, chain or gear drives can be used. Specific recommendations and data on limitations should be obtained.

**Overall Efficiency** is dependent upon operating pressure, speed, oil viscosity and size of unit. Approximates 70% to 80% under maximum recommended conditions.

# **Fluids**

Petroleum Oils - Use antiwear industrial hydraulic oils or automotive crankcase oils having letter designations SC, SD or SE. Running viscosity range 70 to 250 SUS, operating temperature 120°F. recommended, 150°F. usual maximum. For details, refer to data sheet 1-286-S for hydraulic fluid and temperature recommendations.

**Control Valving** used in conjunction with these hydraulic motors must have open center crossover feature to prevent cavitation when shaft is subject to overrunning loads.

**Note:** Back pressure on motor(s) not to exceed:

75% of the supply pressure at 1800 RPM

80% of the supply pressure at 1200 RPM

85% of the supply pressure at 600 RPM

**For Example:** At 1000 PSI and 1800 RPM motor speed, the back pressure should not exceed 750 PSI. These are actual operating pressures at the ports of the motor, (such circuits require a relief valve in both inlet and outlet ports).

Consequently, for applications where cavitation, back pressure and/or series type circuits exist, the S2 type of motor is recommended. Please contact your local Sperry Vickers representative for assistance.

## **Model Code**

Vane Type Hydraulic Motors (Reversible)

Series 200

Connections  
1 - Threaded

Mounting Type  
0 - 2-Bolt Flange  
4 - Foot

Torque Rating Lb. In./100 PSI (Approx.)

25 - 25  
35 - 35

Shaft Type

1 - Straight Keyed  
3 - Threaded  
6 - Straight Stub  
11 - Splined

M2 - 2 10 - 25 - 1 A - 1

Design Number  
Subject To Change. Installation Dimensions Remain As Shown For Design Numbers 10 Thru 19.

Cover Position

"K" Viewed From Cover End)

A - Cover Port Opposite Body Port

B - Cover Port 90° Counterclockwise From Body Port

C - Port Connections Inline

D - Cover Port 90° Clockwise From Body Port

## **Drain Connection**

A full size unrestricted drain line must be connected directly from the case drain connection to a location below the lowest fluid level in the system reservoir.

Pressure surges at the case drain connection may not exceed 25 PSI. Nominal pressure not to exceed 10 PSI. Minimum pressure 0 PSI.

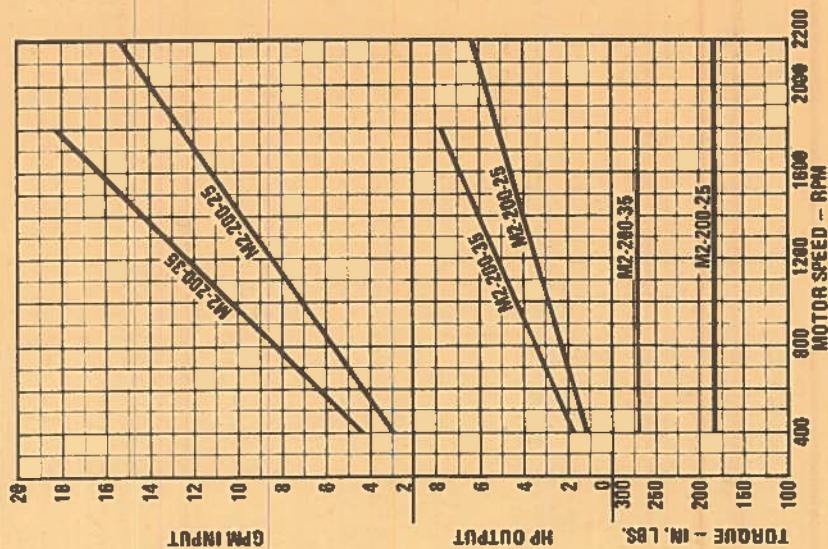
Weight Lbs. (Approx.)

Flange Mounting.....21

Foot Mounting.....26

## **TYPICAL PERFORMANCE CURVES**

OIL TEMPERATURE - 120°F - OIL VISCOSITY 150 SSU @ 100°F.  
ALL CURVES SHOW CHARACTERISTICS AT 1000 PSI INLET PRESSURE





**SPERRY VICKERS**  
TROY, MICHIGAN 48084

**HYDRAULIC  
MOTORS**

**FIXED  
DISPLACEMENT**

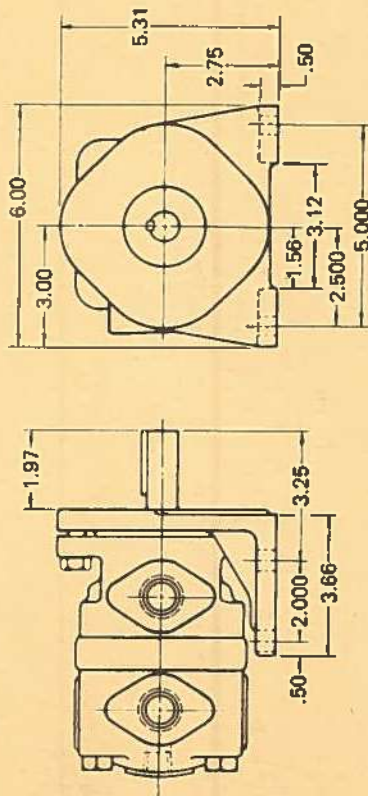
**VANE  
TYPE**

**6.3 OR 7.8  
HORSEPOWER**

**THREADED  
CONNECTIONS**

**2-BOLT FLANGE  
OR FOOT  
MOUNTING**

**DWG. NO.  
520110**



**MODEL M2-214\*1C-13-S2  
FOOT MOUNTING**

(May be assembled in any one of four positions)

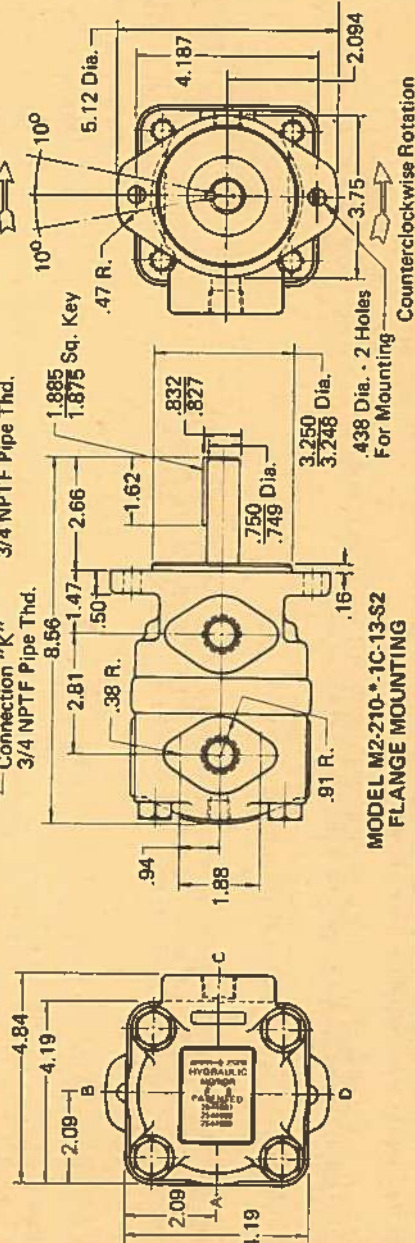
Drain Connection  
3/8 NPTF Pipe Thd.  
(See Note)

"S2" Port Connection  
1/4 NPTF

Note:  
Pilot pressure must be continuously supplied at this port at a level equal to system pressure plus 75 PSI minimum. This may be obtained by using a check valve in the system supply and with pilot pressure taken from between pump and this valve.

Connection "K"  
3/4 NPTF Pipe Thd.

Connection "L"  
3/4 NPTF Pipe Thd.



**MODEL M2-210\*1C-13-S2  
FLANGE MOUNTING**

Model Numbers	Standard Mounting	Foot Mounting	Horsepower	Speed RPM	Maximum Ratings		
					Displacement GPM	Pressure PSI	At Max. RPM
M2-210-25-1*13-S2		M2-214-25-1*13-S2	6.3	2200	15.1	1000	1500
M2-210-35-1*13-S2		M2-214-35-1*13-S2	7.8	1800	18.1		

REVISED 12.1.78

**SPERRY VICKERS**  
T.M.

# HYDRAULIC VANE MOTORS

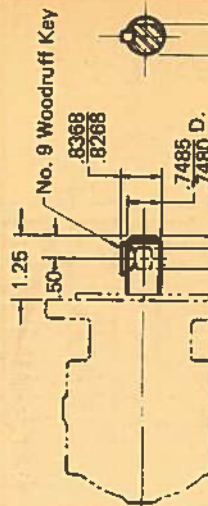
## WITH PRESSURIZED VANE EXTENSION MODEL SERIES M2-200-S2 FIXED DISPLACEMENT - VANE TYPE

All Fluid Motors Listed are of Sperry Vickers exclusive "balanced vane type" construction. Operating Characteristics are of the variable horsepower class: Horsepower output being proportional to RPM as long as operating pressure is constant. See curves on reverse side. Running Torque: See curves on reverse side.

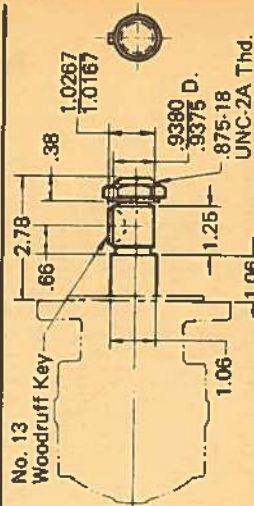
■ Recommended Maximum Operating Pressure: See tabulation below.

■ Recommended Speed as indicated in tabulation is maximum RPM for continuous operation. Recommended Minimum Operating Speeds will vary from 50 to 100 RPM depending upon the size of motor and the characteristics of the driven load.

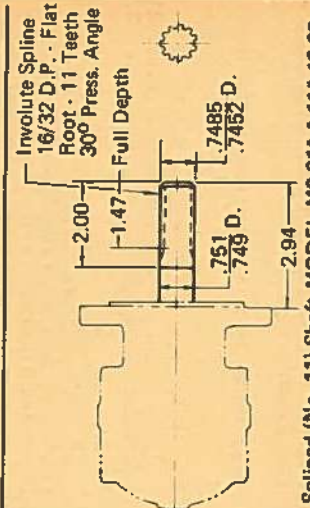
### OPTIONAL SHAFTS



**Straight Stub (No. 6) Shaft MODEL M2-21\*1C-13-S2**



**Threaded (No. 3) Shaft MODEL M2-21\*1C-13-S2**



**Splined (No. 11) Shaft MODEL M2-21\*1C-13-S2**

520110



Output Shaft Rotation can be from "0" to maximum RPM in either direction.

Oil supply to connection "L" turns shaft clockwise.

Oil supply to connection "K" turns shaft counterclockwise.

Service may be reversing or stalled, under load, without damage to fluid motor. A relief valve is required. May be used where variable speeds are desired.

Type of Drive: Direct drive thru flexible coupling is recommended but belt, chain or gear drives can be used. Specific recommendations and data on limitations should be obtained.

Overall Efficiency is dependent upon operating pressure, speed, oil viscosity and size of unit. Approximates 70% to 80% under maximum recommended conditions.

#### Fluids

Petroleum Oils - Use antiwear industrial hydraulic oils or automotive crankcase oils having letter designations SC, SD or SE. Running viscosity range 70 to 250 SUS, operating temperature 120°F. recommended, 150°F. usual maximum. For details, refer to data sheet 1-286-S for hydraulic fluid and temperature recommendations.

Control Valving used in conjunction with these hydraulic motors must have open center crossover feature to prevent cavitation when shaft is subject to overrunning loads. Some circuits require a relief valve in both the inlet and outlet ports.

#### Drain Connection

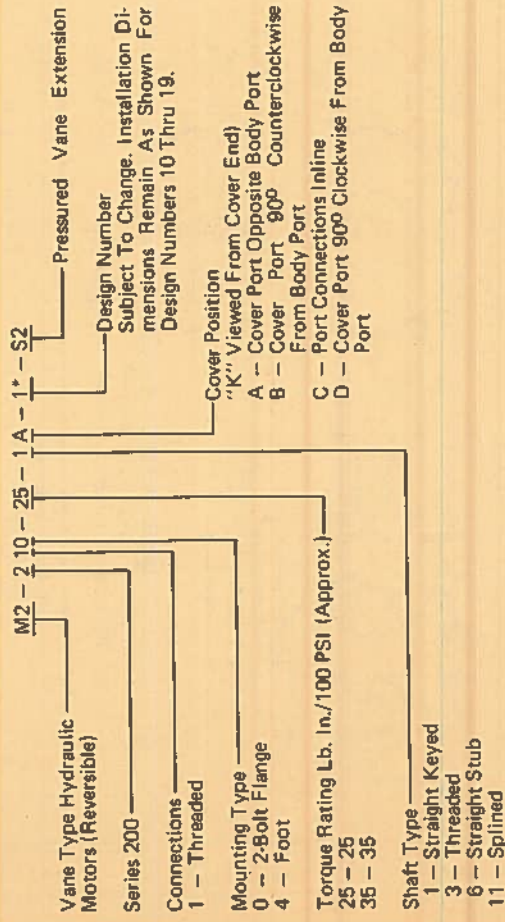
A full size unrestricted drain line must be connected directly from the case drain connection to a location below the lowest fluid level in the system reservoir.

Pressure surges at the case drain connection may not exceed 25 PSI. Nominal pressures not to exceed 10 PSI. Minimum pressure 0 PSI.

#### Weight Lbs. (Approx.)

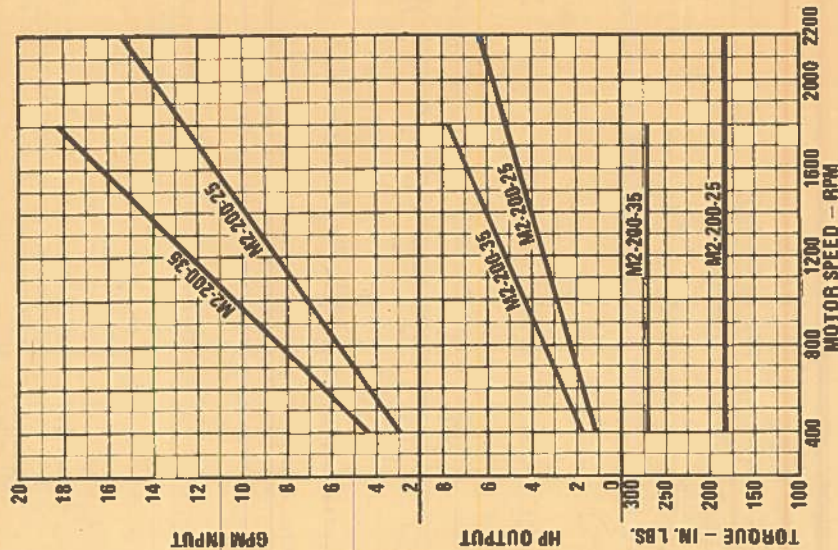
Flange Mounting..... 21  
Foot Mounting..... 26

#### Model Code



#### TYPICAL PERFORMANCE CURVES

OIL TEMPERATURE - 120°F. - OIL VISCOSITY 150 SSU @ 100°F.  
ALL CURVES SHOW CHARACTERISTICS AT 1000 PSI INLET PRESSURE



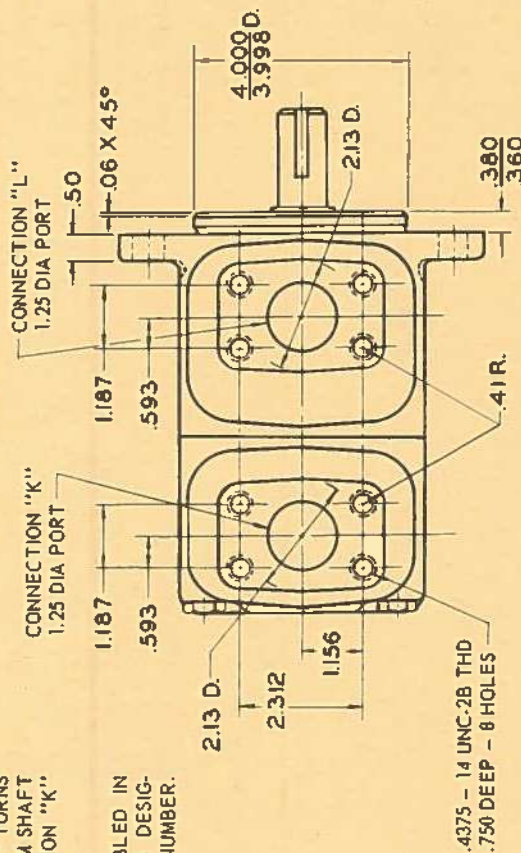


# VICKERS® HIGH PERFORMANCE HYDRAULIC MOTORS

## SERIES 25M (-20 DESIGN) FIXED DISPLACEMENT VANE TYPE

FLUID SUPPLY TO CONNECTION "L" TURNS SHAFT CLOCKWISE AS VIEWED FROM SHAFT END. FLUID SUPPLY TO CONNECTION "K" TURNS SHAFT COUNTERCLOCKWISE.

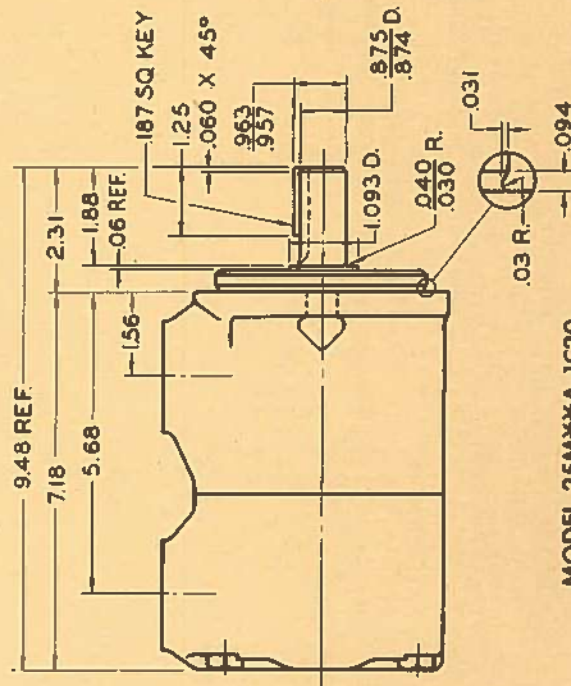
CONNECTION "K" SHOWN ASSEMBLED IN LINE WITH CONNECTION "L" IS DESIGNATED BY LETTER "C" IN MODEL NUMBER.



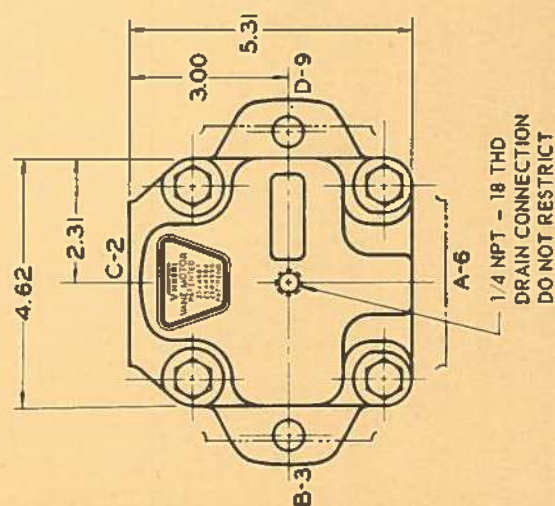
.4375 - 14 UNC-2B THD  
.750 DEEP - 8 HOLES

CLOCKWISE ROTATION

MODEL NUMBER	TORQUE LB. IN. PER 100 PSI	DISPLACEMENT CU. IN. REV.
25M42A-1C20	42	2.68
25M55A-1C20	55	3.52
25M65A-1C20	65	4.19



MODEL 25MXXA-1C20  
STANDARD 2-BOLT MOUNTING  
#1 STRAIGHT KEYED SHAFT



VICKERS DIVISION  
OF SPERRY RAND CORPORATION  
TROY, MICHIGAN 48064

FLUID MOTORS  
FIXED DISPLACEMENT

SERIES 25M  
VANE TYPE

UP TO 73  
OUTPUT  
HORSEPOWER

2-BOLT FLANGE  
& FOOT MOUNTING

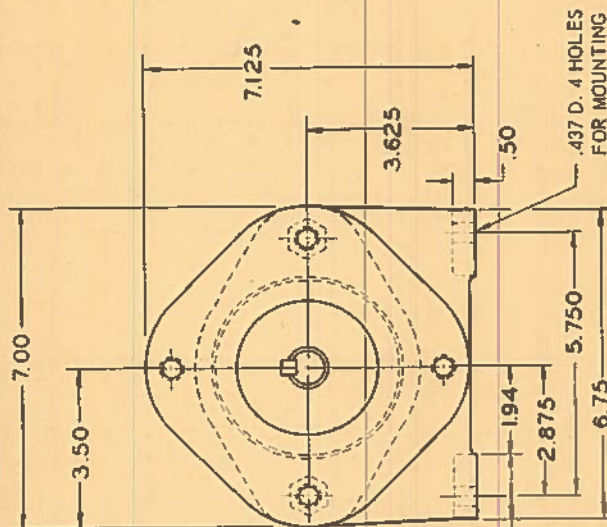
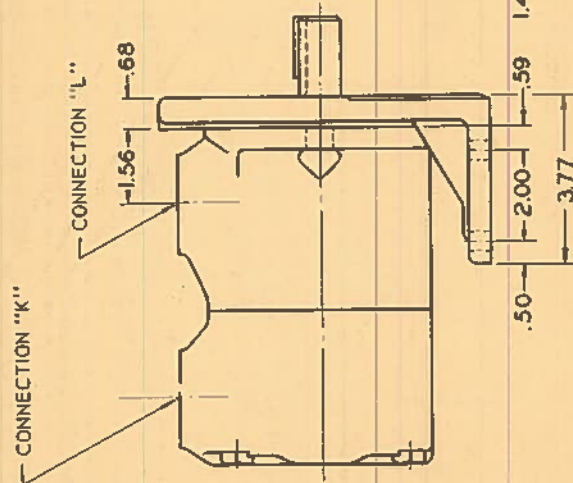
DWG. NO.  
520140

REVISED 1-3-72



# VICKERS® HIGH PERFORMANCE HYDRAULIC MOTORS

SERIES 25M (-20 DESIGN)  
FIXED DISPLACEMENT VANE TYPE



MODEL 25MXXA2-1C20  
FOOT MOUNTING

## FOOT BRACKET MOUNTING

MOTOR MAY BE ASSEMBLED TO FOOT BRACKET WITH CONNECTION "L" IN ANY ONE OF FOUR POSITIONS. THE FOUR OPTIONAL POSITIONS ARE SPECIFIED IN THE MODEL NUMBER AS SHOWN BELOW:

25M\*\*A2-1C20

AS SHOWN - CONNECTION "L" AT 12 O'CLOCK

25M\*\*A3-1C20

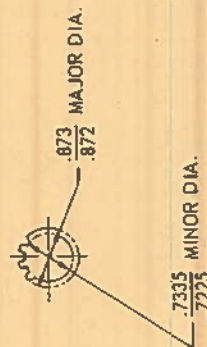
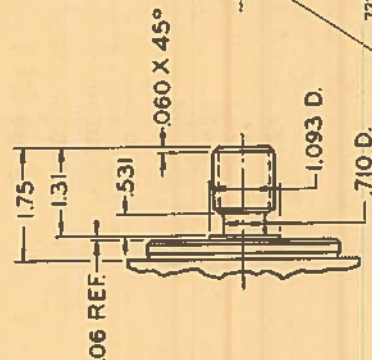
CONNECTION "L" AT 3 O'CLOCK - VIEWED FROM SHAFT END

25M\*\*A6-1C20

CONNECTION "L" AT 6 O'CLOCK - VIEWED FROM SHAFT END

25M\*\*A9-1C20

CONNECTION "L" AT 9 O'CLOCK - VIEWED FROM SHAFT END



SAE INVOLUTE SPLINE DATA  
FLAT ROOT-MAJOR DIA FIT (MODIFIED OD)  
16/32 DIAMETRAL PITCH  
13 TEETH - 30° PRESSURE ANGLE  
.7493 T.I.F. DIA  
.8125 PITCH DIA  
CIR. TOOTH THICKNESS:  
MAX EFFECTIVE ..... .0967  
MIN EFFECTIVE ..... .0955  
MAX ACTUAL ..... .0952  
MIN ACTUAL ..... .0940

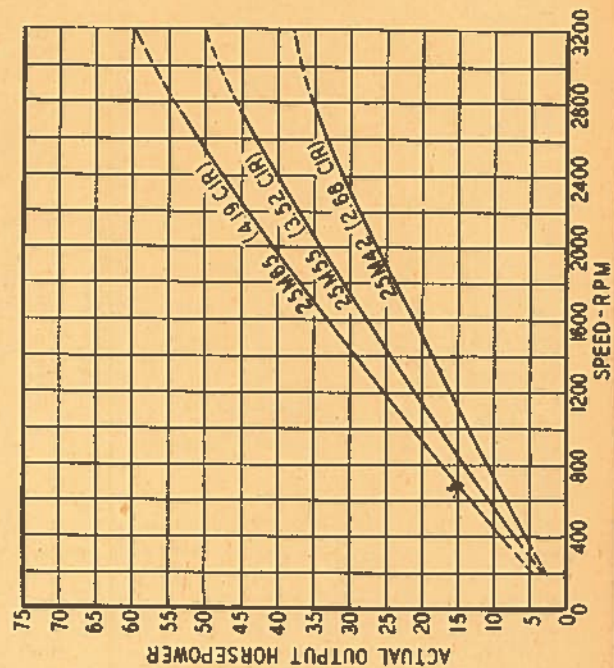
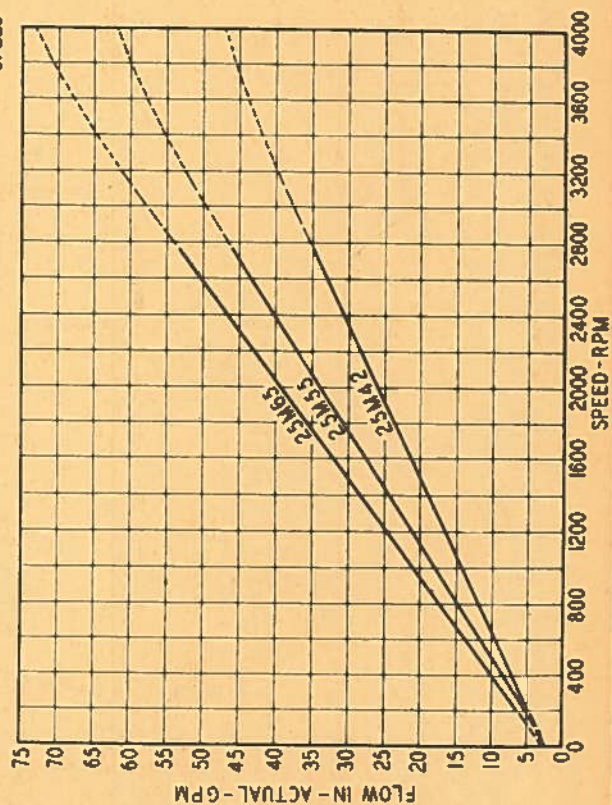
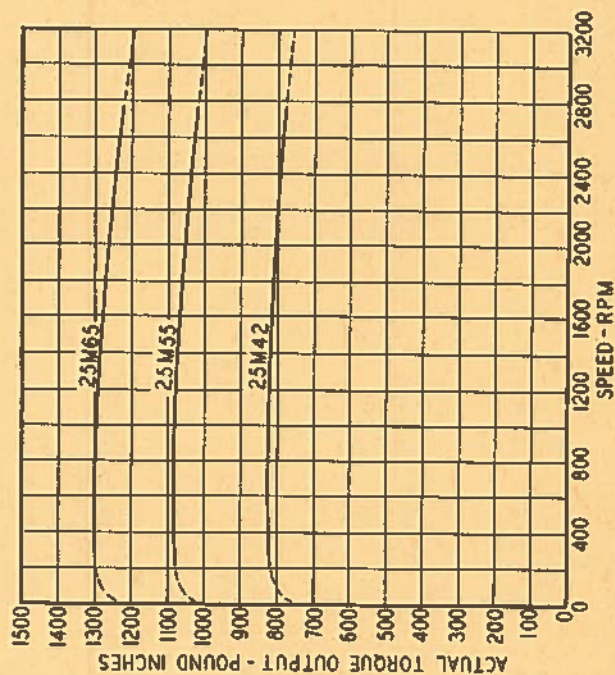
MODEL 25MXXA2-11X20  
# 11 SPLINED SHAFT



# TYPICAL PERFORMANCE CURVES

OIL TEMPERATURE - 120 F. OIL VISCOSITY - 150 SSU AT 100° F. OPERATING PRESSURE - 2000 PSI  
(DASHED PORTION OF CURVES REPRESENTS INTERMITTENT OPERATION)

## SERIES 25M VANE MOTORS (-20 DESIGN)





# GENERAL DATA:

SERIES 25M MOTORS ARE OF VICKERS BALANCED TYPE CONSTRUCTION. OPERATION MAY BE INTERMITTENT OR CONTINUOUS IN EITHER DIRECTION OF ROTATION. WHEN PROPERLY PROTECTED BY VALVING, MOTORS MAY BE USED FOR CYCLE REVERSING OR STALLED WITHOUT DAMAGE.

## OPERATING SPECIFICATIONS:

### MAXIMUM SPEED AND PRESSURE RATINGS

CONTINUOUS OPERATION		INTERMITTENT OPERATION	
SPEED RPM	PRESSURE PSI	SPEED RPM	PRESSURE PSI
3600	500	4000	500
3300	1000	3800	1000
2800	2000	3200	2000
2600 & LOWER	2250	3000 & LOWER	2500

INTERMITTENT SERVICE EQUALS 10% OF OVERALL TIME. EACH APPLICATION OF PRESSURE AND OR SPEED NOT TO EXCEED OVER 6 SECONDS.

## MINIMUM OPERATING SPEED

MINIMUM SPEED IS NORMALLY 100 RPM. LOWER SPEEDS ARE PERMISSIBLE DEPENDING UPON TORQUE REQUIREMENTS AND NATURE OF LOAD.

## CASE DRAIN CONNECTION

A FULL SIZE UNRESTRICTED DRAIN LINE MUST BE CONNECTED DIRECTLY FROM THE CASE DRAIN CONNECTION TO A LOCATION BELOW THE LOWEST FLUID LEVEL IN THE SYSTEM RESERVOIR.

PRESSURE SURGES AT THE DRAIN CONNECTION MAY NOT EXCEED 25 PSI. NOMINAL PRESSURE NOT TO EXCEED 10 PSI. MINIMUM PRESSURE 0 PSI.

## RUNNING TORQUE

STARTING TORQUE ..... 65% (MINIMUM) OF 400 RPM TORQUE

## TYPE OF DRIVE

DIRECT DRIVE THROUGH A FLEXIBLE COUPLING IS RECOMMENDED. HOWEVER, BELT, CHAIN, OR GEAR DRIVES CAN BE USED. FOR SPECIFIC RECOMMENDATIONS CONTACT YOUR VICKERS SALES REPRESENTATIVE.

## DRIVE ROTATION

ROTATION CAN BE TO MAXIMUM RPM IN EITHER DIRECTION.

OIL SUPPLY TO CONNECTION "L" TURNS SHAFT CLOCKWISE. OIL SUPPLY TO CONNECTION "K" TURNS SHAFT COUNTERCLOCKWISE.

FILTRATION (MANDATORY) ..... 25 MICRONS OR LESS

## FLUID

CLEAN PETROLEUM OIL MEETING OR EXCEEDING LUBRICATING QUALITIES OF SAE 10W MEETING API SERVICE CLASSIFICATION MS (MAXIMUM SEVERITY) IS RECOMMENDED FOR NORMAL INDUSTRIAL HYDRAULIC SYSTEM TEMPERATURES (120°F OPTIMUM). REFER TO DATA SHEET I-286-S FOR HYDRAULIC OIL RECOMMENDATIONS.

## WEIGHT (APPROX.)

2-BOLT FLANGE MODELS ..... 40 LBS  
FOOT MOUNTING MODELS ..... 53 LBS

\* THIS MOTOR IS DESIGNED TO MEET SPECIFICATIONS AS OUTLINED. TO INSURE MAXIMUM MOTOR PERFORMANCE IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION, CONSULT YOUR VICKERS APPLICATION ENGINEER IF YOUR:

REQUIRED MINIMUM SPEED IS LESS THAN 100 RPM

APPLICATION REQUIRES AN INDIRECT DRIVE

APPLICATION HAS OVERRUNNING LOADS

APPLICATION REQUIRES BRAKING OR RETARDING

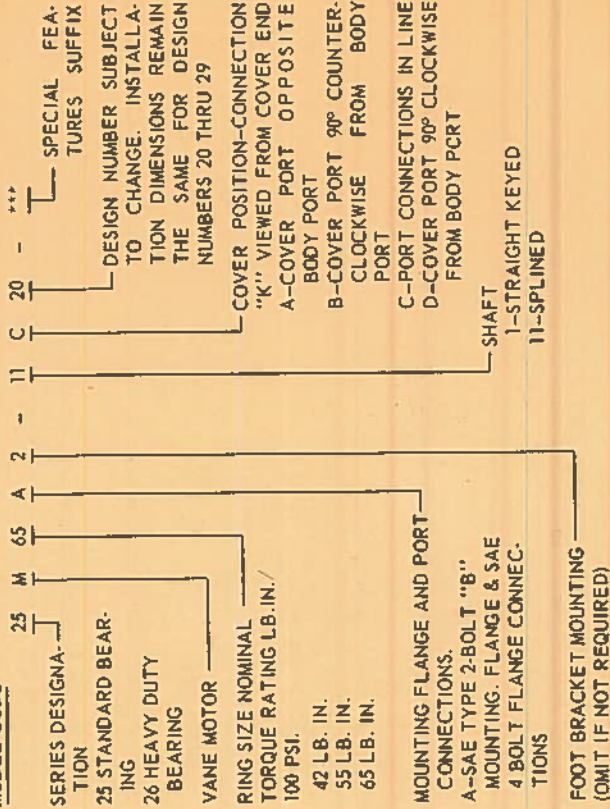
SYSTEM REQUIRES FIRE RESISTANT FLUID

OIL VISCOSITY-AT OPERATING TEMPERATURE IS NOT WITHIN 100 TO 250 SSU

OPERATING TEMPERATURE IS NOT WITHIN 100 TO 150°F. WITH PROPER APPLICATION AND FLUID CONSIDERATION, A GREATER TEMPERATURE RANGE IS PERMISSIBLE

NEEDS REQUIRE APPLICATION ASSISTANCE

## MODEL CODE



SEE PAGE 1 FOR COMPLETE DETAILS.





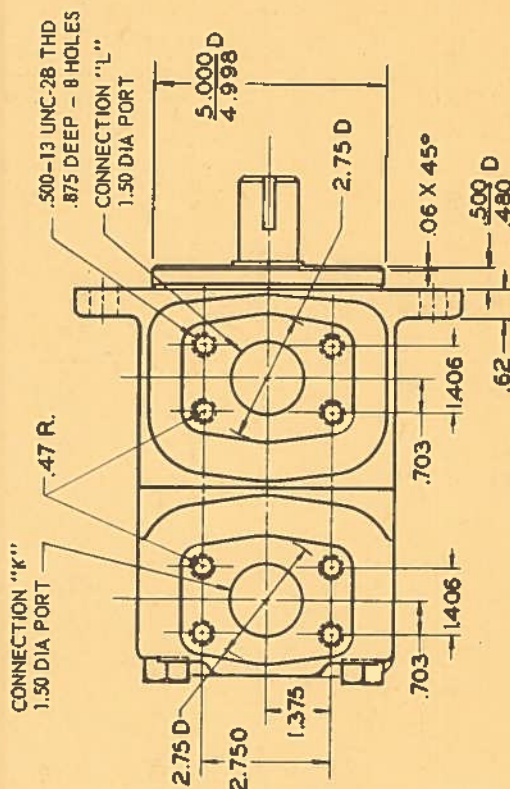
## HIGH PERFORMANCE HYDRAULIC MOTORS

**SERIES 35M (-20 DESIGN)**

### FIXED DISPLACEMENT VANE TYPE

MODEL NUMBER	TORQUE LB IN. PER 100 PSI	DISPLACEMENT CU IN/REV
35M80A-1C20	80	5.10
35M95A-1C20	95	6.12
35M115A-1C20	115	7.42

"K" AND "L" PORTS ACCEPT VICKERS MODEL  
FL1-12-12P-10 OR FL1-12-12W-10 FLANGES.

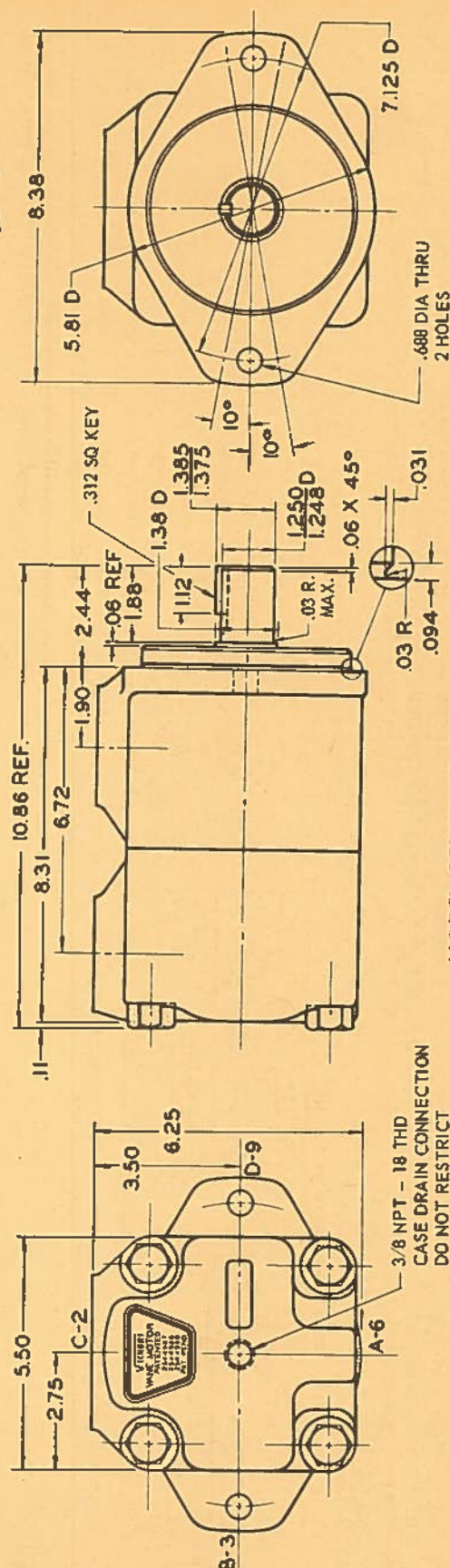


FLUID SUPPLY TO CONNECTION "L" TURNS SHAFT CLOCKWISE AS VIEWED FROM SHAFT END. FLUID SUPPLY TO CONNECTION "K" TURNS SHAFT COUNTERCLOCKWISE.

CONNECTION "K," SHOWN ASSEMBLED IN LINE WITH CONNECTION "L," IS DESIGNATED BY LETTER "C" IN MODEL NUMBER.

4-BOLT CONNECTION PADS ARE FOR USE WITH SAE 4-BOLT FLANGES. SEE DRAWING 1-250700 FOR SELECTION.

4-BOLT SAE PAD CONNECTIONS WILL ALSO ACCOMMODATE APPROPRIATE 2-BOLT FLANGES.



**MODEL 35MXXA-1C20**

**STANDARD 2-BOLT MOUNTING  
#1 STRAIGHT KEYED SHAFT**

VICKERS DIVISION  
OF SPERRY RAND CORPORATION  
TROY, MICHIGAN

FLUID  
MOTOR

FIXED  
DISPLACEMENT

**SERIES 35M**  
**VANE TYPE**

UP TO 131  
OUTPUT  
HORSEPOWER

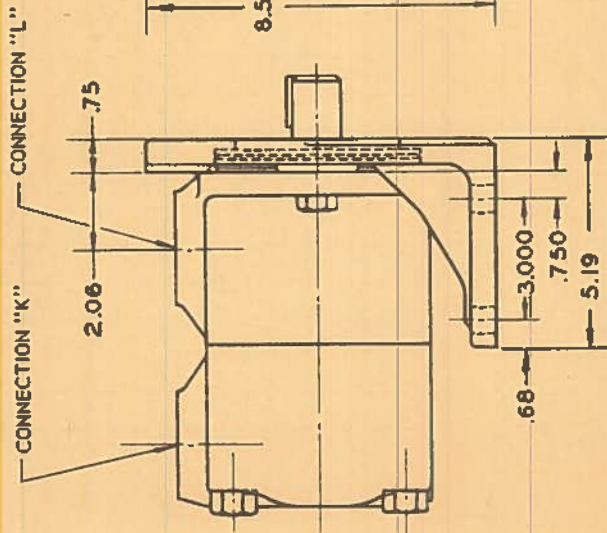
2-BOLT FLANGE  
& FOOT MOUNTING

DWG. NO.  
520150



# HIGH PERFORMANCE HYDRAULIC MOTORS

SERIES 35M (-20 DESIGN)  
FIXED DISPLACEMENT VANE TYPE



MODEL 35MXXXA2-1C20  
FOOT MOUNTING

## FOOT BRACKET MOUNTING

MOTOR MAY BE ASSEMBLED TO FOOT BRACKET WITH CONNECTION "L" IN ANY ONE OF FOUR POSITIONS. THE FOUR OPERATIONAL POSITIONS ARE SPECIFIED IN THE MODEL NUMBER AS SHOWN BELOW:

35M\*\*A2-1C20

AS SHOWN - CONNECTION "L" AT 12 O'CLOCK

35M\*\*A3-1C20

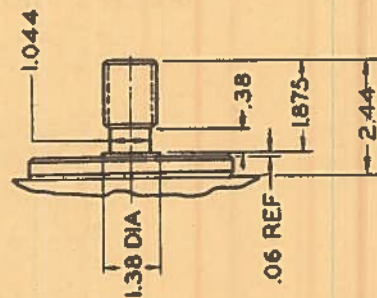
CONNECTION "L" AT 3 O'CLOCK - VIEWED FROM SHAFT END

35M\*\*A6-1C20

CONNECTION "L" AT 6 O'CLOCK - VIEWED FROM SHAFT END

35M\*\*A9-1C20

CONNECTION "L" AT 9 O'CLOCK - VIEWED FROM SHAFT END



SAE INVOLUTE SPLINE DATA  
FLAT ROOT - MAJOR DIA FIT (MODIFIED OD)

12/24 DIAMETRAL PITCH

14 TEETH - 30° PRESSURE ANGLE

1.0822 T.I.F. DIA

1.1667 PITCH DIA

CIR TOOTH THICKNESS:

MAX EFFECTIVE .1294

MIN EFFECTIVE .1282

MAX ACTUAL .1277

MIN ACTUAL .1265



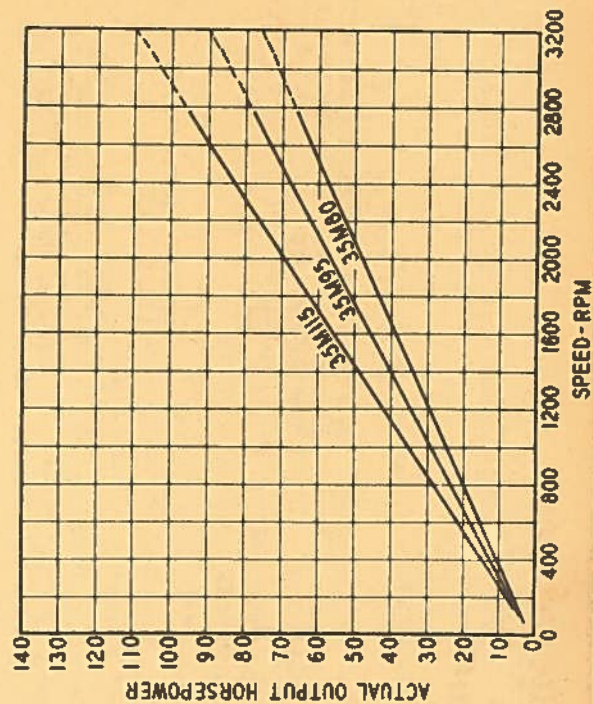
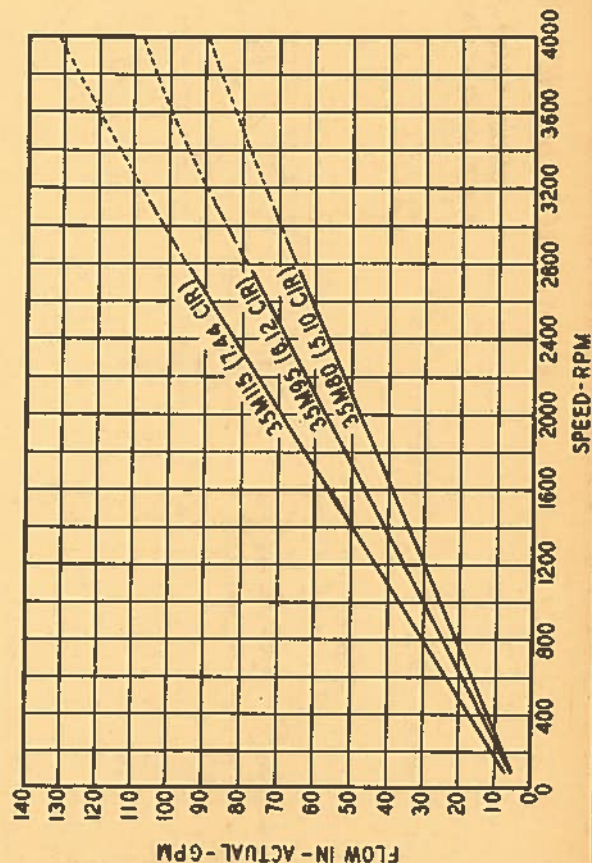
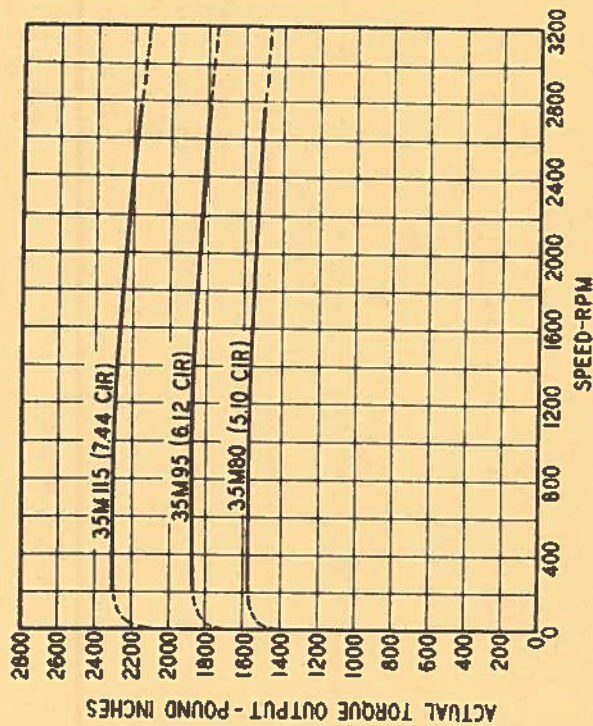
MODEL 35MXXXA2-11X20  
# 11 SPLINED SHAFT



# TYPICAL PERFORMANCE CURVES

OIL TEMPERATURE - 120 F. OIL VISCOSITY - 150 SSU AT 100° F. OPERATING PRESSURE - 2000 PSI  
(DASHED PORTION OF CURVES REPRESENTS INTERMITTENT OPERATION)

## SERIES 35M VANE MOTORS (-20 DESIGN)





# GENERAL DATA:

SERIES 35M MOTORS ARE OF VICKERS BALANCED TYPE CONSTRUCTION. OPERATION MAY BE INTERMITTENT OR CONTINUOUS IN EITHER DIRECTION OF ROTATION. WHEN PROPERLY PROTECTED BY VALVING, MOTORS MAY BE USED FOR CYCLE REVERSING OR STALLED WITHOUT DAMAGE.

## OPERATING SPECIFICATIONS:

### MAXIMUM SPEED AND PRESSURE RATINGS

CONTINUOUS OPERATION		INTERMITTENT OPERATION	
SPEED RPM	PRESSURE PSI	SPEED RPM	PRESSURE PSI
3600	500	4000	500
3300	1000	3800	1000
2800	2000	3200	2000
2600 & LOWER	2250	3000 & LOWER	2500

INTERMITTENT SERVICE EQUALS 10% OF OVERALL TIME. EACH APPLICATION OF PRESSURE AND OR SPEED NOT TO EXCEED OVER 6 SECONDS.

## • MINIMUM OPERATING SPEED

MINIMUM SPEED IS NORMALLY 100 RPM. LOWER SPEEDS ARE PERMISSIBLE DEPENDING UPON TORQUE REQUIREMENTS AND NATURE OF LOAD.

## CASE DRAIN CONNECTION

A FULL SIZE UNRESTRICTED DRAIN LINE MUST BE CONNECTED DIRECTLY FROM THE CASE DRAIN CONNECTION TO A LOCATION BELOW THE LOWEST FLUID LEVEL IN THE SYSTEM RESERVOIR.

PRESSURE SURGES AT THE DRAIN CONNECTION MAY NOT EXCEED 25 PSI. NOMINAL PRESSURE NOT TO EXCEED 10 PSI. MINIMUM PRESSURE 0 PSI

RUNNING TORQUE ..... SEE CURVES  
STARTING TORQUE ..... 65% (MINIMUM) OF 400 RPM TORQUE

## • TYPE OF DRIVE

DIRECT DRIVE THROUGH A FLEXIBLE COUPLING IS RECOMMENDED. HOWEVER, BELT, CHAIN, OR GEAR DRIVES CAN BE USED. FOR SPECIFIC RECOMMENDATIONS CONTACT YOUR VICKERS SALES REPRESENTATIVE.

## DRIVE ROTATION

ROTATION CAN BE TO MAXIMUM RPM IN EITHER DIRECTION.

OIL SUPPLY TO CONNECTION "L" TURNS SHAFT CLOCKWISE. OIL SUPPLY TO CONNECTION "K" TURNS SHAFT COUNTERCLOCKWISE.

FILTRATION (MANDATORY) ..... 25 MICRONS OR LESS

## • FLUID

CLEAN PETROLEUM OIL MEETING OR EXCEEDING LUBRICATING QUALITIES OF SAE 10W MEETING API SERVICE CLASSIFICATION MS (MAXIMUM SEVERITY) IS RECOMMENDED FOR NORMAL INDUSTRIAL HYDRAULIC SYSTEM TEMPERATURES (120°F OPTIMUM).

## APPROX. WEIGHT (DRY)

2-BOLT MOUNTING MODELS ..... 64 LBS  
FOOT MOUNTING MODELS ..... 77 LBS

• THIS MOTOR IS DESIGNED TO MEET SPECIFICATIONS AS OUTLINED. TO INSURE MAXIMUM MOTOR PERFORMANCE IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION, CONSULT YOUR VICKERS APPLICATION ENGINEER IF YOUR:

REQUIRED MINIMUM SPEED IS LESS THAN 100 RPM

APPLICATION REQUIRES AN INDIRECT DRIVE

APPLICATION HAS OVERRUNNING LOADS.

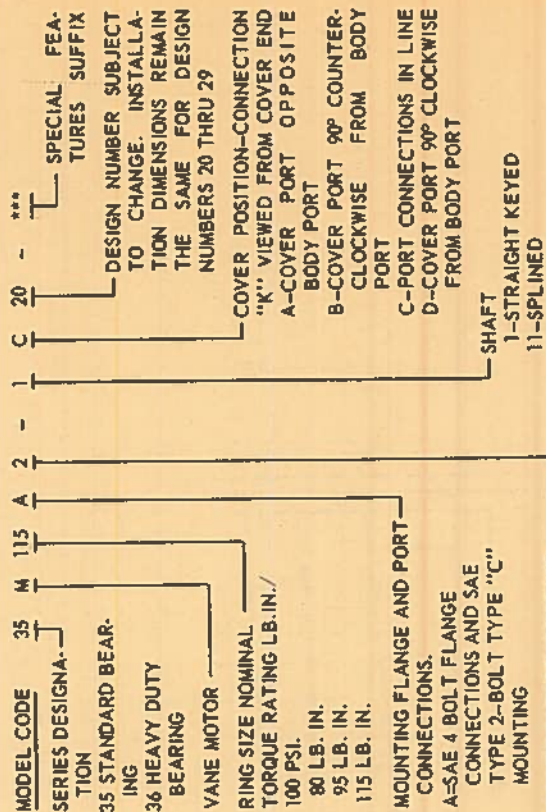
APPLICATION REQUIRES BRAKING OR RETARDING.

SYSTEM REQUIRES FIRE RESISTANT FLUID.

OIL VISCOSITY AT OPERATING TEMPERATURE IS NOT WITHIN 100 TO 250 SSU

OPERATING TEMPERATURE IS NOT WITHIN 100 TO 150°F. WITH PROPER APPLICATION AND FLUID CONSIDERATION, A GREATER TEMPERATURE RANGE IS PERMISSIBLE.

NEEDS REQUIRE APPLICATION ASSISTANCE.





SPERRY RAND

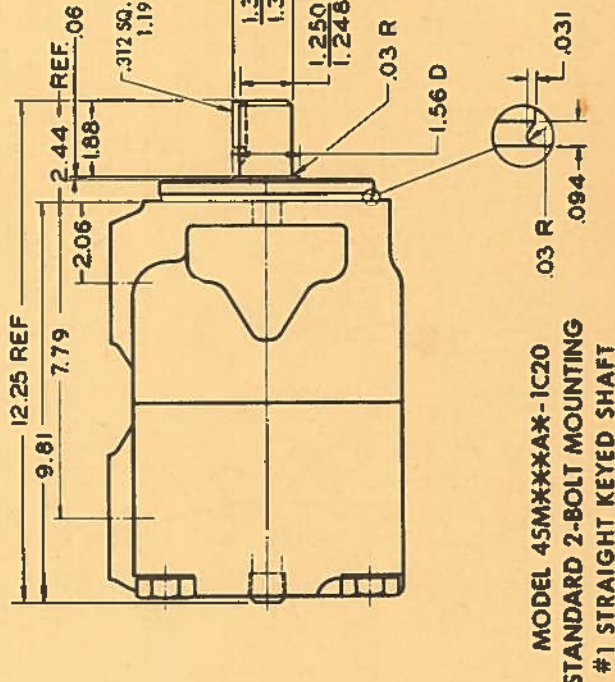
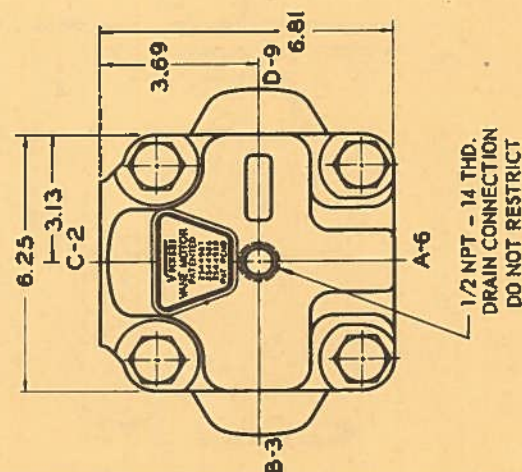
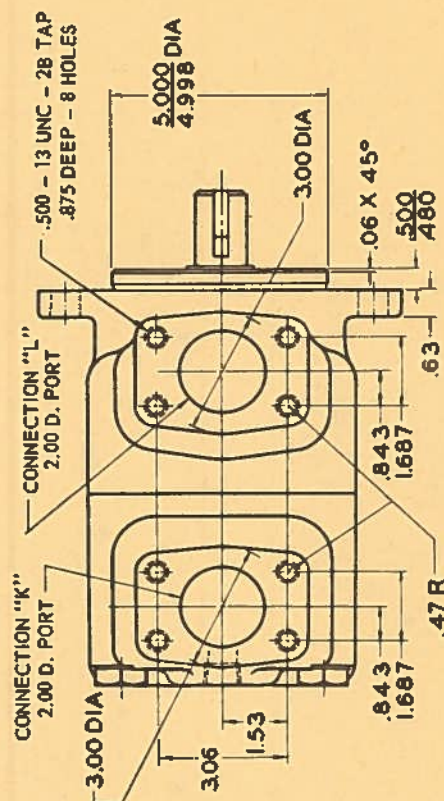
# **VICKERS** HIGH PERFORMANCE HYDRAULIC MOTORS SERIES 45M (-20 DESIGN) FIXED DISPLACEMENT VANE TYPE

FLUID SUPPLY TO CONNECTION "L" TURNS SHAFT CLOCKWISE AS VIEWED FROM SHAFT END. FLUID SUPPLY TO CONNECTION "K" TURNS SHAFT COUNTERCLOCKWISE.

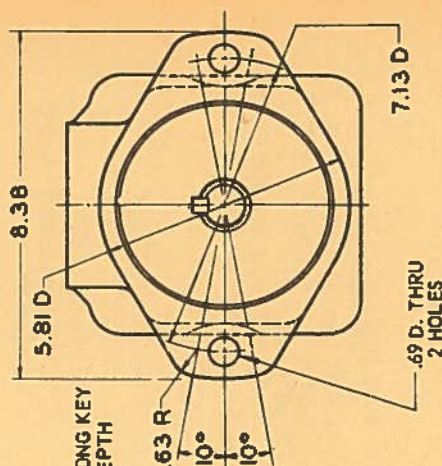
CONNECTION "K," SHOWN ASSEMBLED IN LINE WITH CONNECTION "L," IS DESIGNATED BY LETTER "C" IN MODEL NUMBER.

4-BOLT CONNECTION PADS ARE FOR USE WITH SAE 4-BOLT FLANGES. SEE DRAWING I-250700 FOR SELECTION.

4-BOLT SAE PAD CONNECTIONS WILL ALSO ACCOMMODATE APPROPRIATE 2-BOLT FLANGES.



CLOCKWISE ROTATION



MODEL NUMBER	TORQUE IN. LB PER 100 PSI	DISPLACEMENT CU IN/REV
45M130A-1C20	130	8.42
45M155A-1C20	155	9.96
45M185A-1C20	185	11.79

"K" AND "L" PORTS ACCEPT VICKERS' MODEL FL1-16-16P-10 OR FL1-16-16W-10 FLANGES

VICKERS DIVISION  
 OF  
 SPERRY RAND CORPORATION  
 TROY, MICHIGAN

FLUID  
 MOTORS

FIXED  
 DISPLACEMENT

SERIES 45M  
 VANE TYPE

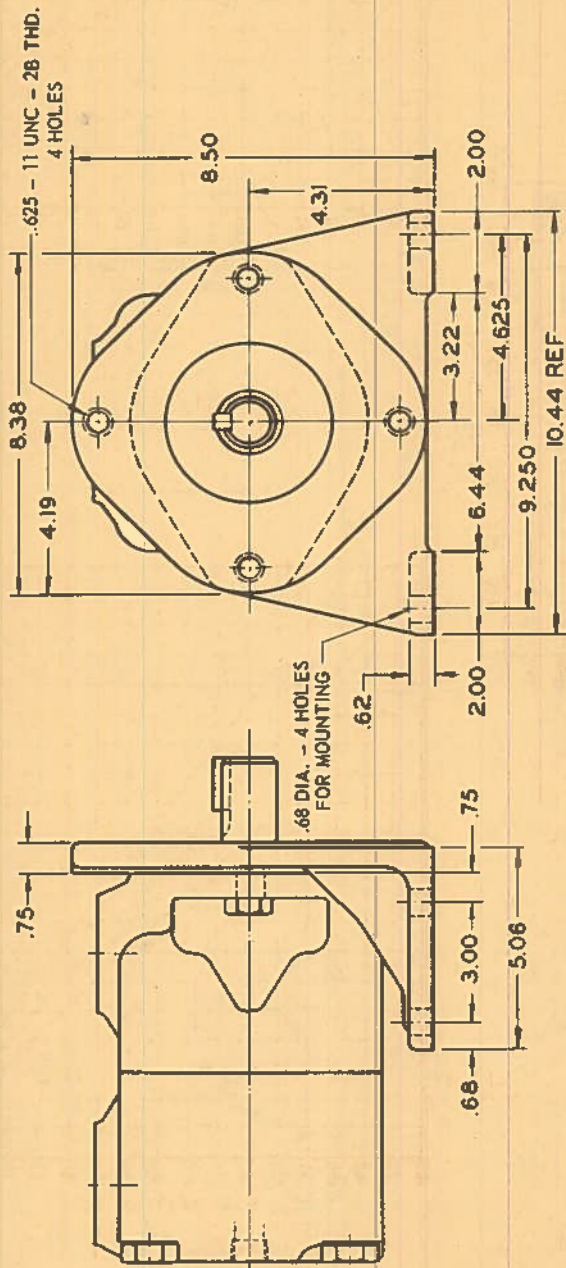
FLANGE &  
 FOOT MOUNTING

DWG. NO.  
 520200



# VICKERS HIGH PERFORMANCE HYDRAULIC MOTORS

SERIES 45M (-20 DESIGN)  
FIXED DISPLACEMENT VANE TYPE



## FOOT BRACKET MOUNTING

MOTOR MAY BE ASSEMBLED TO FOOT BRACKET WITH CONNECTION "L" IN ANY ONE OF FOUR POSITIONS. THE FOUR OPERATIONAL POSITIONS ARE SPECIFIED IN THE MODEL NUMBER AS SHOWN BELOW:

45M\*\*\*A2-1C20

AS SHOWN - CONNECTION "L" AT 12 O'CLOCK

45M\*\*\*A3-1C20

CONNECTION "L" AT 3 O'CLOCK - VIEWED FROM SHAFT END

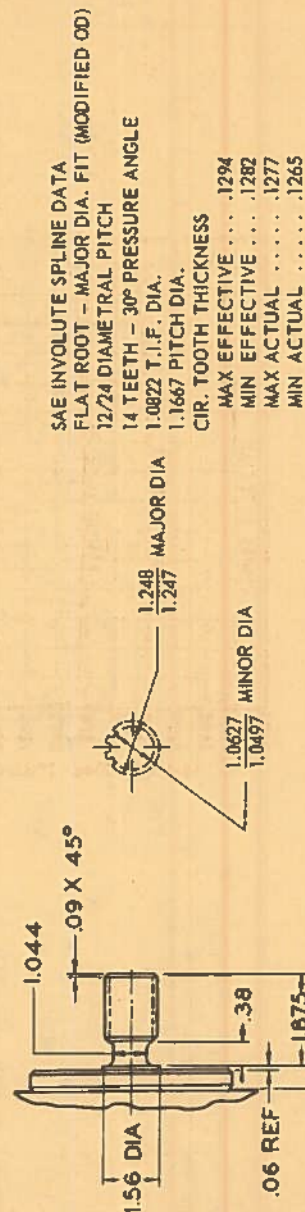
45M\*\*\*A6-1C20

CONNECTION "L" AT 6 O'CLOCK - VIEWED FROM SHAFT END

45M\*\*\*A9-1C20

CONNECTION "L" AT 9 O'CLOCK - VIEWED FROM SHAFT END

## MODEL 45M\*\*\*A2-1C20 FOOT MOUNTING



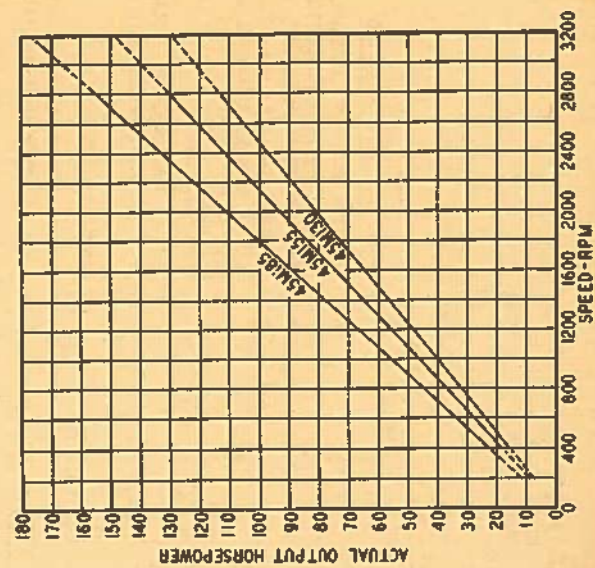
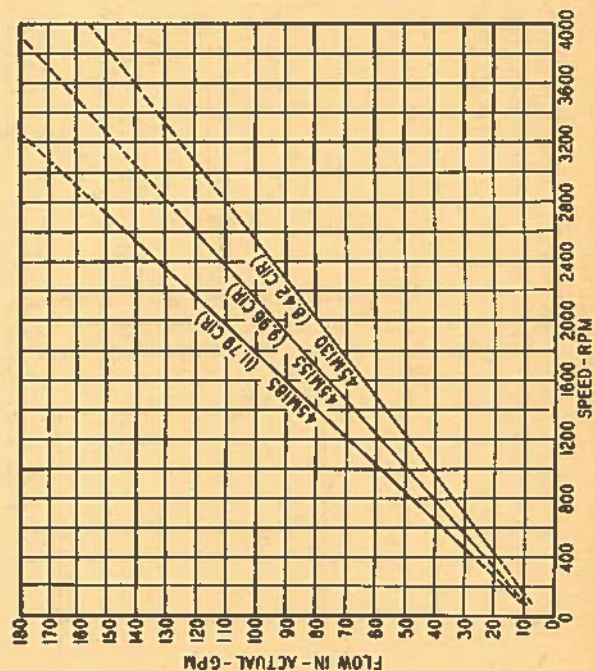
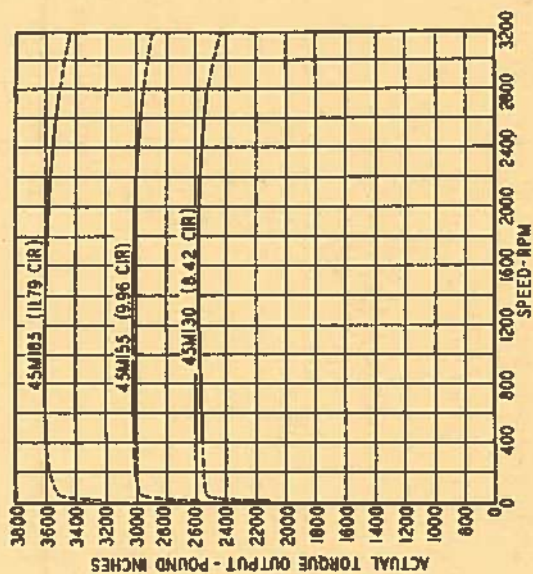
## MODEL 45M\*\*\*A2-11\*20 # 11 SPLINED SHAFT



# TYPICAL PERFORMANCE CURVES

OIL TEMPERATURE - 120 F. OIL VISCOSITY - 150 SSU AT 100° F. OPERATING PRESSURE - 2000 PSI  
(DASHED PORTION OF CURVES REPRESENTS INTERMITTENT OPERATION)

## SERIES 45M VANE MOTORS (-20 DESIGN)





# GENERAL DATA

SERIES 45M MOTORS ARE OF VICKERS "BALANCED" VANE-TYPE CONSTRUCTION. OPERATION MAY BE INTERMITTENT OR CONTINUOUS IN EITHER DIRECTION OF ROTATION. WHEN PROPERLY PROTECTED BY VALVING, MOTORS MAY BE USED FOR CYCLIC REVERSING OR STALLED WITHOUT DAMAGE.

## OPERATING SPECIFICATIONS

MAXIMUM SPEED AND PRESSURE RATINGS				
CONTINUOUS OPERATION		INTERMITTENT OPERATION		
SPEED- RPM	PRESSURE- PSI	SPEED- RPM	PRESSURE- PSI	
3600	500	4000	500	
3300	1000	3800	1000	
2800	2000	3200	2000	
2600 AND LOWER	2250	3000 AND LOWER	2500	

A INTERMITTENT SERVICE EQUALS 10% OF OVERALL TIME, EACH APPLICATION OF PRESSURE AND OR SPEED NOT TO EXCEED SIX SECONDS.

## MINIMUM OPERATING-SPEED

MINIMUM SPEED IS NORMALLY 100 RPM. LOWER SPEEDS ARE PERMISSIBLE DEPENDING UPON TORQUE REQUIREMENTS AND CHARACTERISTICS OF THE DRIVEN LOAD.

## DRAIN LINE

RECOMMENDED MAXIMUM CASE PRESSURE IS:

CONTINUOUS	..... 10 PSI
INTERMITTENT	..... 25 PSI
RUNNING TORQUE	..... SEE CURVES
STARTING TORQUE	..... 65% (MINIMUM) OF 400 RPM TORQUE

## TYPE OF DRIVE

DIRECT DRIVE THROUGH A FLEXIBLE COUPLING IS RECOMMENDED. HOWEVER, BELT, CHAIN OR GEAR DRIVES CAN BE USED. SPECIFIC RECOMMENDATIONS AND DATA ON LIMITATIONS SHOULD BE OBTAINED THROUGH THE VICKERS SALES REPRESENTATIVE.

## DRIVE ROTATION

ROTATION CAN BE TO MAXIMUM RPM IN EITHER DIRECTION.

OIL SUPPLY TO CONNECTION "L" TURNS SHAFT CLOCKWISE. OIL SUPPLY TO CONNECTION "K" TURNS SHAFT COUNTERCLOCKWISE.

FILTRATION (MANDATORY) ..... 25 MICRONS OR LESS

## FLUID

CLEAN PETROLEUM OIL MEETING OR EXCEEDING LUBRICATING QUALITIES OF SAE 10W MEETING API SERVICE CLASSIFICATION MS (MAXIMUM SEVERITY) IS RECOMMENDED FOR NORMAL INDUSTRIAL HYDRAULIC SYSTEM TEMPERATURES (120 OPTIMUM).

## APPROX. WEIGHT (DRY)

2 BOLT MTG. MODELS	..... 85 LBS.
FOOT MTG. MODELS	..... 98 LBS.

\* THIS UNIT IS DESIGNED TO MEET SPECIFICATIONS AS OUTLINED. TO INSURE MAXIMUM UNIT PERFORMANCE IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION. CONSULT YOUR VICKERS APPLICATION ENGINEER IF YOUR:

REQUIRED MINIMUM SPEED IS LESS THAN 100 RPM

APPLICATION REQUIRES AN INDIRECT DRIVE

APPLICATION HAS OVERRUNNING LOADS.

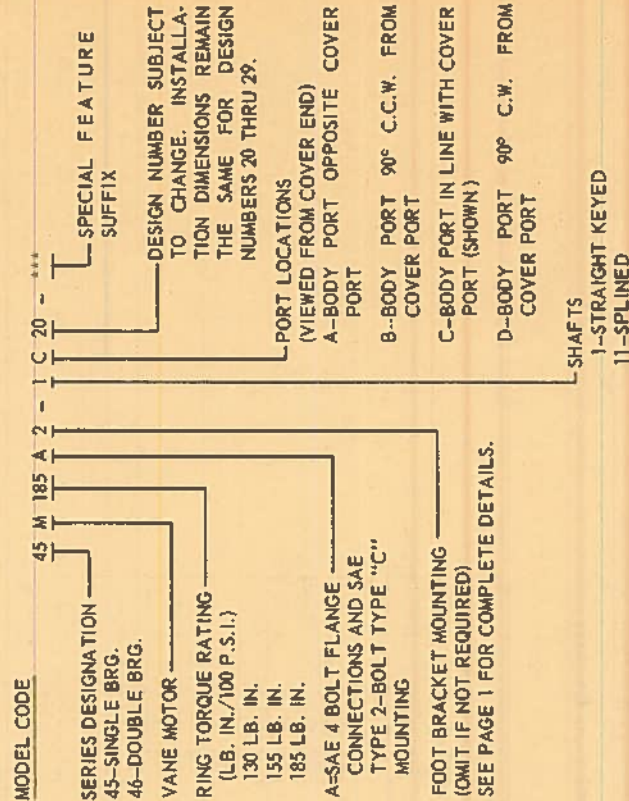
APPLICATION REQUIRES BRAKING OR RETARDING.

SYSTEM REQUIRES FIRE-RESISTANT FLUID

OIL VISCOSITY AT OPERATING TEMPERATURE IS NOT WITHIN 100 TO 250 SSU

OPERATING TEMPERATURE IS NOT WITHIN 100 F. TO 150 F. WITH PROPER APPLICATION AND FLUID CONSIDERATION, A GREATER TEMPERATURE RANGE IS PERMISSIBLE.

NEEDS REQUIRE APPLICATION ASSISTANCE

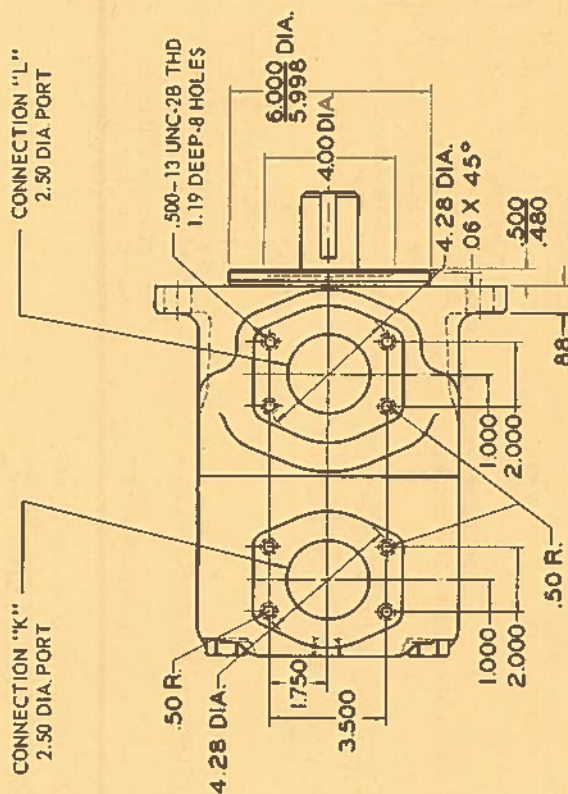




# **VICKERS® HIGH PERFORMANCE HYDRAULIC MOTORS** SERIES 50M (-20 DESIGN) CONSTANT DISPLACEMENT - VANE TYPE

MODEL NUMBER	TORQUE LB IN. PER 100 PSI	DISPLACEMENT CU IN./REV
50M220A-1C20	220	14.11
50M255A-1C20	255	16.36
50M300A-1C20	300	19.35

"K" AND "L" PORTS ACCEPT VICKERS MODEL FL1-20-20P-10 OR FL1-20-20W-10 FLANGES.



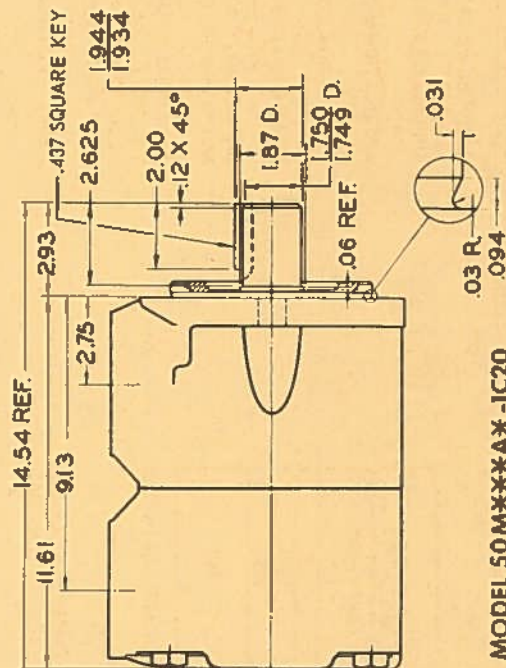
FLUID SUPPLY TO CONNECTION "L" TURNS SHAFT CLOCKWISE AS VIEWED FROM SHAFT END. FLUID SUPPLY TO CONNECTION "K" TURNS SHAFT COUNTERCLOCKWISE.

CONNECTION "K", SHOWN ASSEMBLED IN LINE WITH CONNECTION "L" IS DESIGNATED BY LETTER "C" IN MODEL NUMBER.

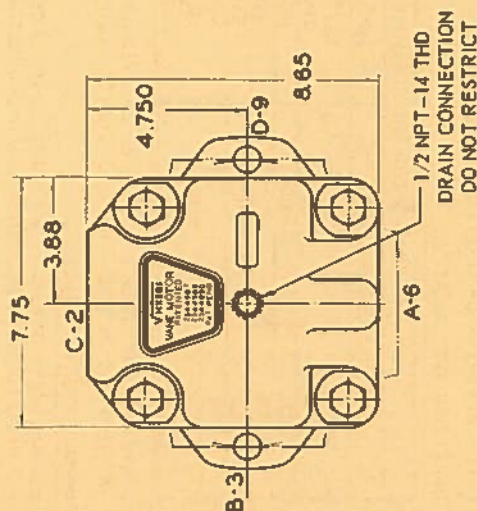
4-BOLT CONNECTION PADS ARE FOR USE WITH SAE 4-BOLT FLANGES. SEE DRAWING I-250700 FOR SELECTION.

4-BOLT SAE PAD CONNECTIONS WILL ALSO ACCOMMODATE APPROPRIATE 2-BOLT FLANGES.

CLOCKWISE ROTATION



MODEL 50MXXXAX-1C20  
 STANDARD 2-BOLT MOUNTING  
 #1 STRAIGHT KEYED SHAFT



VICKERS DIVISION  
 OF SPERRY RAND CORPORATION  
 TROY, MICHIGAN 48064

FLUID MOTOR

FIXED DISPLACEMENT

SERIES 50M VANE TYPE

UP TO 230 OUTPUT HORSEPOWER

2-BOLT FLANGE & FOOT MOUNTING

DWG. NO. 520210

REVISED 1.3.72

520210



**VICKERS® HIGH PERFORMANCE HYDRAULIC MOTORS**

**SERIES 50M (-20 DESIGN)**

### CONSTANT DISPLACEMENT - VANE TYPE

## FOOT BRACKET MOUNTING

MOTOR MAY BE ASSEMBLED TO FOOT BRACKET WITH CONNECTION "L" IN ANY ONE OF FOUR POSITIONS. THE FOUR OPERATIONAL POSITIONS ARE SPECIFIED IN THE MODEL NUMBER AS SHOWN BELOW:

50M\*\*A2-1C20

AS SHOWN - CONNECTION "L"  
AT 12 O'CLOCK

50M\*\*\*A3-1C20

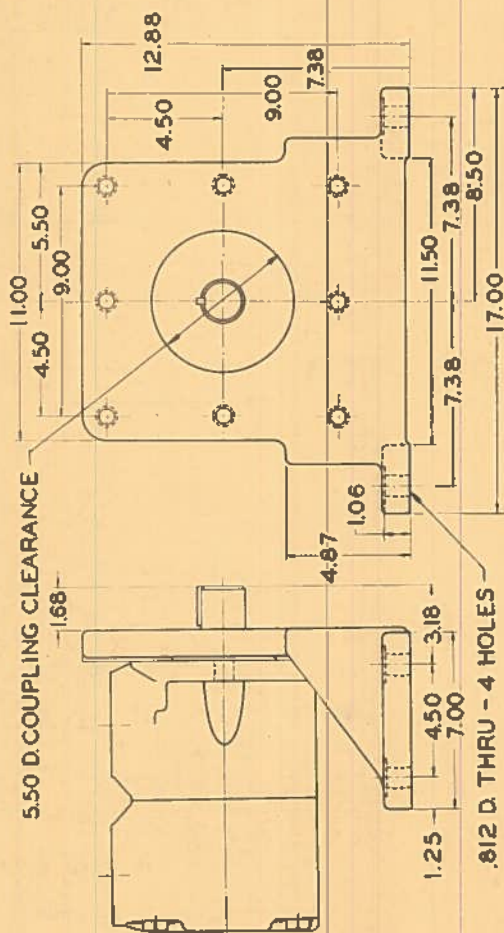
CONNECTION "L" AT 3 O'CLOCK -  
VIEWED FROM SHAFT END

50M\*\*\*A6-1C20

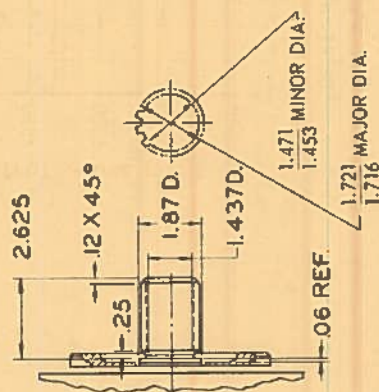
CONNECTION "L" AT 6 O'CLOCK -  
VIEWED FROM SHAFT END

50M\*\*\*A9-1C20

CONNECTION "L" AT 9 O'CLOCK -  
VIEWED FROM SHAFT END



**MODEL 50M\*\*A2-1C20**  
**FOOT MOUNTING**



SAE INVOLUTE SPLINE DATA  
FLAT ROOT - MAJOR DIA. FIT (MODIFIED OD)

8/16 DIAMETRAL PITCH

### 13 TEETH-30° PRESSURE ANGLE

1.5014 T.I.F. DIA.

1.6250 PITCH DIA.

CIR. TOOTH THICKNESS:

MAY EFFECTIVE 1948

MAX EFFECTIVE ...	1948
MIN EFFECTIVE	1025

MIN	EFFECTIVE	...	1935
1945	1950	1955	1960
1965	1970	1975	1980
1985	1990	1995	2000
2005	2010	2015	2020
2025	2030	2035	2040
2045	2050	2055	2060
2065	2070	2075	2080
2085	2090	2095	2100
2105	2110	2115	2120
2125	2130	2135	2140
2145	2150	2155	2160
2165	2170	2175	2180
2185	2190	2195	2200
2205	2210	2215	2220
2225	2230	2235	2240
2245	2250	2255	2260
2265	2270	2275	2280
2285	2290	2295	2300
2305	2310	2315	2320
2325	2330	2335	2340
2345	2350	2355	2360
2365	2370	2375	2380
2385	2390	2395	2400
2405	2410	2415	2420
2425	2430	2435	2440
2445	2450	2455	2460
2465	2470	2475	2480
2485	2490	2495	2500
2505	2510	2515	2520
2525	2530	2535	2540
2545	2550	2555	2560
2565	2570	2575	2580
2585	2590	2595	2600
2605	2610	2615	2620
2625	2630	2635	2640
2645	2650	2655	2660
2665	2670	2675	2680
2685	2690	2695	2700
2705	2710	2715	2720
2725	2730	2735	2740
2745	2750	2755	2760
2765	2770	2775	2780
2785	2790	2795	2800
2805	2810	2815	2820
2825	2830	2835	2840
2845	2850	2855	2860
2865	2870	2875	2880
2885	2890	2895	2900
2905	2910	2915	2920
2925	2930	2935	2940
2945	2950	2955	2960
2965	2970	2975	2980
2985	2990	2995	3000
3005	3010	3015	3020
3025	3030	3035	3040
3045	3050	3055	3060
3065	3070	3075	3080
3085	3090	3095	3100
3105	3110	3115	3120
3125	3130	3135	3140
3145	3150	3155	3160
3165	3170	3175	3180
3185	3190	3195	3200
3205	3210	3215	3220
3225	3230	3235	3240
3245	3250	3255	3260
3265	3270	3275	3280
3285	3290	3295	3300
3305	3310	3315	3320
3325	3330	3335	3340
3345	3350	3355	3360
3365	3370	3375	3380
3385	3390	3395	3400
3405	3410	3415	3420
3425	3430	3435	3440
3445	3450	3455	3460
3465	3470	3475	3480
3485	3490	3495	3500
3505	3510	3515	3520
3525	3530	3535	3540
3545	3550	3555	3560
3565	3570	3575	3580
3585	3590	3595	3600
3605	3610	3615	3620
3625	3630	3635	3640
3645	3650	3655	3660

	MAX ACTUAL	1931
1931	1010	1010

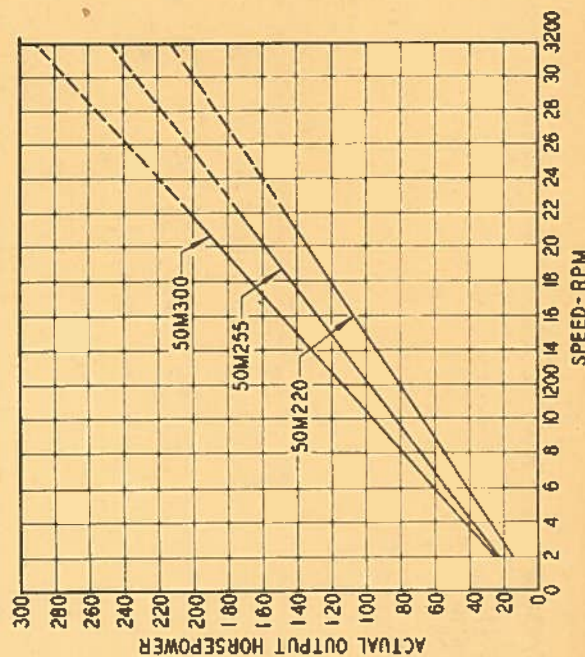
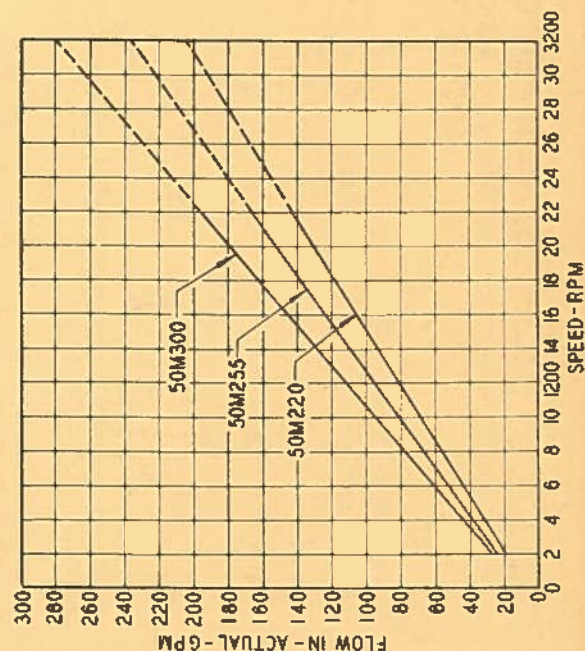
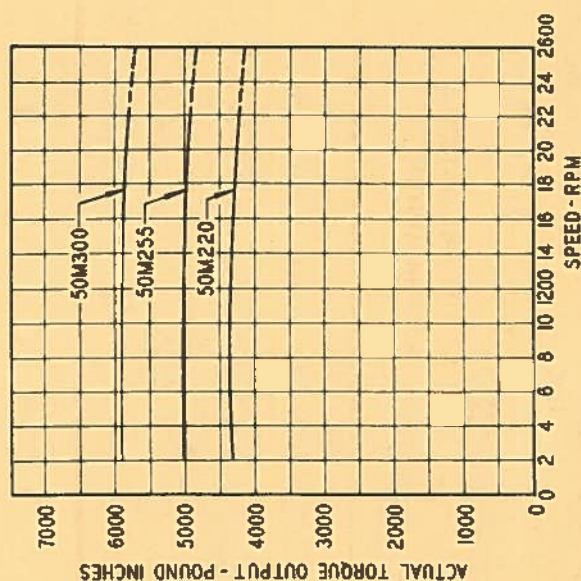
MODEL 50MXXXA\*-11\*20  
# 11 SPLINED SHAFT



# TYPICAL PERFORMANCE CURVES

OIL TEMPERATURE - 120 F. OIL VISCOSITY - 150 SSU AT 100° F OPERATING PRESSURE - 2000 PSI  
(DASHED PORTION OF CURVES REPRESENTS INTERMITTENT OPERATION)

## SERIES 50M VANE MOTORS (-20 DESIGN)





## GENERAL DATA

SERIES 50M MOTORS ARE OF VICKERS "BALANCED" VANE-TYPE CONSTRUCTION. OPERATION MAY BE INTERMITTENT OR CONTINUOUS IN EITHER DIRECTION OF ROTATION. WHEN PROPERLY PROTECTED BY VALVING, MOTORS MAY BE USED FOR CYCLIC REVERSING OR STALLED WITHOUT DAMAGE.

### OPERATING SPECIFICATIONS

MAXIMUM SPEED AND PRESSURE RATINGS

CONTINUOUS OPERATION		▲ INTERMITTENT OPERATION	
SPEED RPM	PRESSURE PSI	SPEED RPM	PRESSURE PSI
2800	500	3200	500
2650	1000	3000	1000
2400	1500		
2250	2000	2600	2000
2200	2250	2400	2250

▲ INTERMITTENT SERVICE EQUALS 10% OF OVERALL TIME; EACH APPLICATION OF PRESSURE AND/OR SPEED NOT TO EXCEED SIX SECONDS.

### • MINIMUM OPERATING SPEED

MINIMUM SPEED IS NORMALLY 100 RPM. LOWER SPEEDS ARE PERMISSIBLE DEPENDING UPON TORQUE REQUIREMENTS AND CHARACTERISTICS OF THE DRIVEN LOAD.

### CASE DRAIN CONNECTION

A FULL SIZE UNRESTRICTED DRAIN LINE MUST BE CONNECTED DIRECTLY FROM THE CASE DRAIN CONNECTION TO A LOCATION BELOW THE LOWEST FLUID LEVEL IN THE SYSTEM RESERVOIR.

PRESSURE SURGES AT THE DRAIN CONNECTION MAY NOT EXCEED 25 PSI. NOMINAL PRESSURE NOT TO EXCEED 10 PSI. MINIMUM PRESSURE 0 PSI.

RUNNING TORQUE ..... SEE CURVES  
STARTING TORQUE ..... 65% (MINIMUM) OF 400 RPM TORQUE

### • TYPE OF DRIVE

DIRECT DRIVE THROUGH A FLEXIBLE COUPLING IS RECOMMENDED. HOWEVER, BELT, CHAIN OR GEAR DRIVES CAN BE USED. SPECIFIC RECOMMENDATIONS AND DATA ON LIMITATIONS SHOULD BE OBTAINED THROUGH THE VICKERS SALES REPRESENTATIVE.

### DRIVE ROTATION

ROTATION CAN BE TO MAXIMUM RPM IN EITHER DIRECTION.

OIL SUPPLY TO CONNECTION "L" TURNS SHAFT CLOCKWISE. OIL SUPPLY TO CONNECTION "K" TURNS SHAFT COUNTERCLOCKWISE.

FILTRATION (MANDATORY) ..... 25 MICRONS OR LESS

### • FLUID

CLEAN PETROLEUM OIL MEETING OR EXCEEDING LUBRICATING QUALITIES OF SAE 10W MEETING API SERVICE CLASSIFICATION MS (MAXIMUM SEVERITY) IS RECOMMENDED FOR NORMAL INDUSTRIAL HYDRAULIC SYSTEM TEMPERATURES (120° OPTIMUM). REFER TO DATA SHEET 1-286-S FOR HYDRAULIC OIL RECOMMENDATIONS.

### WEIGHT (APPROX.)

2-BOLT FLANGE MODELS ..... 160 LBS.  
FOOT MTG. MODELS ..... 230 LBS.

• THIS MOTOR IS DESIGNED TO MEET SPECIFICATIONS AS OUTLINED. TO INSURE MAXIMUM MOTOR PERFORMANCE IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION, CONSULT YOUR VICKERS APPLICATION ENGINEER IF YOUR:

REQUIRED MINIMUM SPEED IS LESS THAN 100 RPM

APPLICATION REQUIRES AN INDIRECT DRIVE

APPLICATION HAS OVERRUNNING LOADS

APPLICATION REQUIRES BRAKING OR RETARDING

SYSTEM REQUIRES FIRE RESISTANT FLUID

OIL VISCOSITY AT OPERATING TEMPERATURE IS NOT WITHIN 100 TO 250 SSU

OPERATING TEMPERATURE IS NOT WITHIN 100 TO 150° F. WITH PROPER APPLICATION AND FLUID CONSIDERATION, A GREATER TEMPERATURE RANGE IS PERMISSIBLE

NEEDS REQUIRE APPLICATION ASSISTANCE

### MODEL CODE

50 M 220 A 2 - 1 C 20 - \*\*\*

SERIES DESIGNATION  
50-SINGLE BRG.  
51-DOUBLE BRG.

VANE MOTOR

RING TORQUE RATING  
(LB. IN./100 P.S.I.)  
220 LB. IN.  
255 LB. IN.  
300 LB. IN.

PORT CONNECTIONS  
A-4 BOLT FLANGE

FOOT BRACKET MOUNTING  
(OMIT IF NOT REQUIRED)  
SEE PAGE 1 FOR COMPLETE DETAILS.

SHAFTS  
1-STRAIGHT KEYS  
11-SPLINED

SPECIAL FEATURE  
SUFFIX

DESIGN NUMBER SUBJECT TO CHANGE. INSTALLATION DIMENSIONS REMAIN THE SAME FOR DESIGN NUMBERS 20 THRU 29.

PORT LOCATIONS  
(VIEWED FROM COVER END)  
A-BODY PORT OPPOSITE COVER PORT  
B-BODY PORT 90° C.C.W. FROM COVER PORT  
C-BODY PORT IN LINE WITH COVER PORT (SHOWN)  
D-BODY PORT 90° C.W. FROM COVER PORT



# GENERAL DATA

THE MHT-32 IS A HIGH-TORQUE, LOW-SPEED VANE MOTOR. THIS UNIT IS CAPABLE OF SMOOTH MOTORING SPEEDS THROUGHOUT ITS ENTIRE PRESSURE AND SPEED RANGE. IT WILL PERFORM WELL AT MAXIMUM RATED RPM IN EITHER DIRECTION OF ROTATION.

FLUID TO PORT "B" GIVES CW ROTATION VIEWED FROM PORT "A" END AND TO PORT "A" GIVES CCW ROTATION. IN THE EVENT OF HYDRAULIC SURGE PRESSURES APPLIED TO, OR GENERATED BY, THE MOTOR, RELIEF PROTECTION MUST BE PROVIDED IN THE CIRCUIT TO PREVENT THESE SURGES FROM EXCEEDING THE MAXIMUM PRESSURE RATING. THE INLET MUST BE PROVIDED WITH A SUFFICIENT AMOUNT OF OIL TO PREVENT CAVITATION IN OVERRUNNING LOADS. GENERALLY, BRAKING APPLICATIONS ARE NOT APPROVED; CONSULT YOUR LOCAL SPERRY VICKERS REPRESENTATIVE IF ASSISTANCE IS NEEDED.

## RATINGS

THEORETICAL DISPLACEMENT (REF. 104 GALLONS/REV.)	24.0 CU. IN./REV.
MAXIMUM ROTATING PRESSURE	3000 PSI
MAXIMUM STALL PEAK PRESSURE AND MAXIMUM SUM OF PRESSURE TO BOTH PORTS "A" AND "B" (STALLED)	4000 PSI
MAXIMUM OPERATING SPEED	0 - 275 RPM
@ 3000 ΔPSI (CONTINUOUS)	0 - 400 RPM
@ 2000 ΔPSI (CONTINUOUS)	384 lbf-in
THEORETICAL TORQUE/100 ΔPSI (REF. 32 lbf-ft)	

**SPERRY VICKERS**  
TROY, MICHIGAN 48064

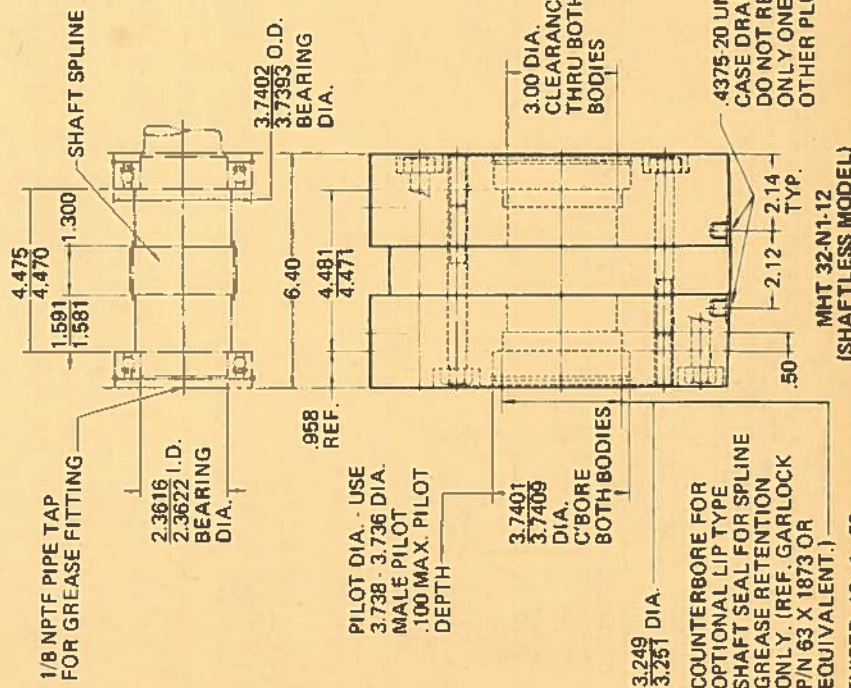
VANE MOTOR

THEORETICAL TORQUE  
IN. LBS./100 PSI  
384

THEORETICAL DISPLACEMENT  
CU. IN./REV.  
24.0

0 TO 400 RPM  
SPEED RANGE

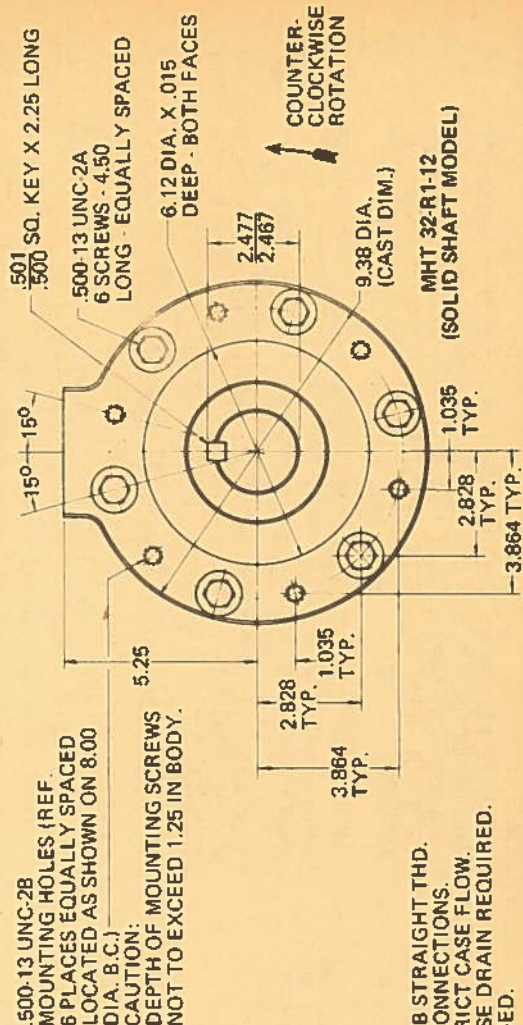
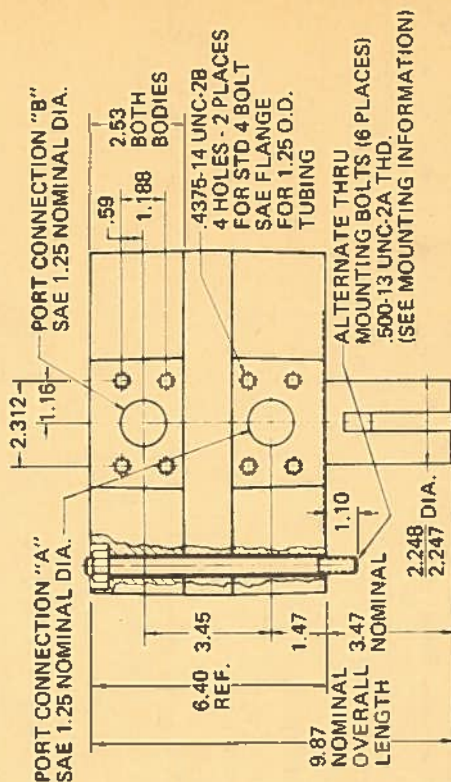
DWG. NO.  
520220



REVISED 12-1-78

# HYDRAULIC VANE MOTORS

MODEL SERIES MHT-32  
HIGH TORQUE - LOW SPEED  
FIXED DISPLACEMENT



520220



## MOUNTING AND APPLICATION INFORMATION

### MODEL MHT-32-N1-12 - SHAFTLESS

WITH A SHAFTLESS ASSEMBLY, CUSTOMER SHAFT SHALL PROVIDE ITS OWN BEARINGS, AND CENTER THE ROTOR WITHIN .004 T.I.R. CONCENTRICITY TO THE PILOT DIAMETERS. (SHAFTLESS MODELS HAVE NO BEARINGS.)

CUSTOMER'S SHAFT DESIGN MUST PROVIDE FOR SPLINE GREASE RETENTION. SPLINE IS NOT LUBRICATED BY SYSTEM FLUID. CUSTOMER'S SHAFT NEEDS NO SHAFT SEAL SURFACE FOR SYSTEM FLUID RETENTION.

A SEALING COVER MAY BE MADE FOR SHAFTLESS MODELS (REQUEST DESIGN ASSISTANCE SKETCH 23803-K). USE IN BEARING COUNTERBORE WITH "O" RING 154092 AND SNAP RING 351810 (SEALING COVER NOT MANUFACTURED BY SPERRY VICKERS - FOR CUSTOMER INFORMATION ONLY).

### SHAFT SPLINE DATA

EXTERNAL INVOLUTE SPLINE

FILLET ROOT - SIDE FIT

PITCH DIAMETER - 2.7500 REF.

BASE DIAMETER - 2.3816 REF.

NO. OF TEETH - 44

DIAMETRAL PITCH - 16/32

PRESSURE ANGLE - 30°

FORM DIAMETER - 2.6820

MAJOR DIAMETER - 2.8125/2.8075

WHEN INSTALLING OR DISASSEMBLING A SHAFT, THE SPLINE MUST HAVE A SLIP FIT INTO ROTOR. THERE SHALL BE NO BINDING AND NO AXIAL FORCE APPLIED.

### MODEL MHT-32-N1 & R1-12

MOUNTING SURFACE MUST BE FLAT OR CONCAVE SO THAT BODIES ARE NOT FORCED INWARD REMOVING INTERNAL RUNNING CLEARANCE.

HOUSING WILL NOT ACCEPT EXTERNAL AXIAL LOADING EXCEPT AT 8.00 BOLT DIAMETER.

ROTOR WILL NOT TAKE SHAFT TRANSLATION WHILE TORQUING (SLIDING AXIALLY THRU SPLINE).

IF THE SHAFT MUST ABSORB AXIAL FORCES, PRELOADING WILL BE REQUIRED TO PREVENT ANY TRANSLATION. (CONSULT SPERRY VICKERS LOCAL REPRESENTATIVE.)

SHAFT SPLINE SHOULD BE PACKED WITH FIBROUS WHEEL BEARING GREASE AT SIX 1/4" INT. INTERVALS.

SYSTEM CONNECTION PADS ARE FOR USE WITH SAE 4-BOLT FLANGES. REFER TO INSTALLATION DRAWING I-250700 FOR INFORMATION REGARDING SPERRY VICKERS FL1 SERIES SAE 4-BOLT FLANGES.

IF APPLICATION REQUIRES THAT MOUNTING FACE BE SEALED, A SEALING AREA HAS BEEN PROVIDED FOR 6.234 I.D. X .139 CSD "O" RING (SPERRY VICKERS NO. 154112).

MOTORS MAY BE SUPPLIED WITH THREADS DRILLED OUT OF MOUNTING SURFACE BODY FOR THRU MOUNTING WITH STANDARD STUDS OR SCREWS, IF REQUIRED. TORQUE TO 90 ± 5 lbf-ft OILED. THRU STUDS NOT INCLUDED. S13 - THREADS DRILLED FROM SHAFT END BODY; S18 - FROM HEAD END BODY.

MOTOR MOUNTING ORIENTATION IS UNRESTRICTED AS TO PORT LOCATION AND MOUNTING FACE. THE SHAFT MAY PROTRUDE FROM EITHER BODY.

### INSTALLATION

FILTRATION:

IT IS GOOD PRACTICE TO LUBRICATE THE INTERNAL PARTS OF THESE NEW UNITS WITH HYDRAULIC FLUID BEFORE START UP. ADD THE HYDRAULIC FLUID USED TO THE INLET, OUTLET OR CASE OF THE MHT MOTORS PRIOR TO STARTING. FOR MORE COMPLETE INFORMATION ON START UP, PLEASE CONTACT YOUR LOCAL SPERRY VICKERS REPRESENTATIVE.

35 MICRONS ABSOLUTE OR FINER

MS 10W TO 20W OR EQUIVALENT

## FLUIDS

PETROLEUM OILS - ANTIWEAR TYPE INDUSTRIAL HYDRAULIC OILS OR AUTOMOTIVE CRANKCASE OILS HAVING LETTER DESIGNATIONS SC, SD, OR SE. REFER TO DATA SHEET I-286-S FOR FLUID AND TEMPERATURE RECOMMENDATIONS USED WITH INDUSTRIAL MACHINERY.

RUNNING VISCOSITY RANGE 70 TO 250 SUS. OPERATING TEMPERATURE 120° F RECOMMENDED, 180° F USUAL MAXIMUM.

WATER GLYCOLS - SELECT FLUIDS WITH AN OPERATING VISCOSITY OF THE PETROLEUM OIL DESCRIBED ABOVE. RECOMMENDED MAXIMUM TEMPERATURE 130° F. SYNTHETIC FIRE RESISTANT FLUIDS - PHOSPHATE ESTERS AND THEIR BLENDS WITH OPERATING VISCOSITY OF THE PETROLEUM OIL DESCRIBED ABOVE. THESE FLUIDS ARE GENERALLY COMPATIBLE WITH FLUOROCARBON AND SILICONE ELASTOMERS. ADD F3 TO THE MODEL NUMBER.

### BEARING DATA

BEARING CAPACITY (RADIAL OR AXIAL) ..... 5070 LBS. AFBMA @ 33-1/3 RPM, 500 HOURS 8-10 LIFE, 2425 LBS. @ 50 RPM, 15000 HOURS AVERAGE LIFE (UNRELATED TO MOTOR LIFE).

TEMPERATURE: (FLUID AT MOTOR INLET) ..... 120°F. TYP. TO 180°F. MAX. CASE DRAIN PRESSURE AT THE MOTOR CASE PORT ..... 0 TO 25 PSI MAX. PERFORMANCE DATA FOR SPECIFIC APPLICATIONS AVAILABLE ON REQUEST FROM YOUR SPERRY VICKERS APPLICATION ENGINEER.

APPROXIMATE INERTIA OF MHT ROTATING GROUP WITHOUT SHAFT ..... 50 lbf-in<sup>2</sup> WITH SHAFT ..... 60 lbf-in<sup>2</sup> 13 lbf-in-SEC. 2 16 lbf-in-SEC. 2

### CAUTION

INTERMITTENT (15 MINUTES OR LESS) UNLOADED RUNNING IS PERMITTED AFTER PROPER START AND WARM UP TO 400 RPM. CASE OUTLET FLOW SHOULD BE UNRESTRICTED AND CHECKED TO ENSURE SOME FLOW. THERE SHOULD BE A MINIMUM OF .05 GPM TOTAL. WHEN MOTOR IS COLD AND OIL IS HOT, START AND STOP MOTOR UNTIL TEMPERATURES ARE EQUALIZED (DO NOT EXCEED 50°F. DIFFERENTIAL).

### WEIGHT LBS. (APPROX.)

WITH SHAFT ..... 120 WITHOUT SHAFT ..... 105

SPECIAL SEALS SEE FLUIDS AND SEALS NOTE.	F3 - M HT 32 - R 1 - 12	DESIGN NUMBER SUBJECT TO CHANGE. IN- STALLATION DIMENSIONS REMAIN AS SHOWN FOR DE- SIGN NUMBERS 10 THRU 19.
MOTOR		SHAFT TYPE R - SOLID N - NONE
HIGH TORQUE TYPE		SHAFT VARIATIONS
MOTOR SIZE - THEORETICAL OUTPUT TORQUE lbf-ft/100 PSI		

### STANDARD GRAPHICAL SYMBOL

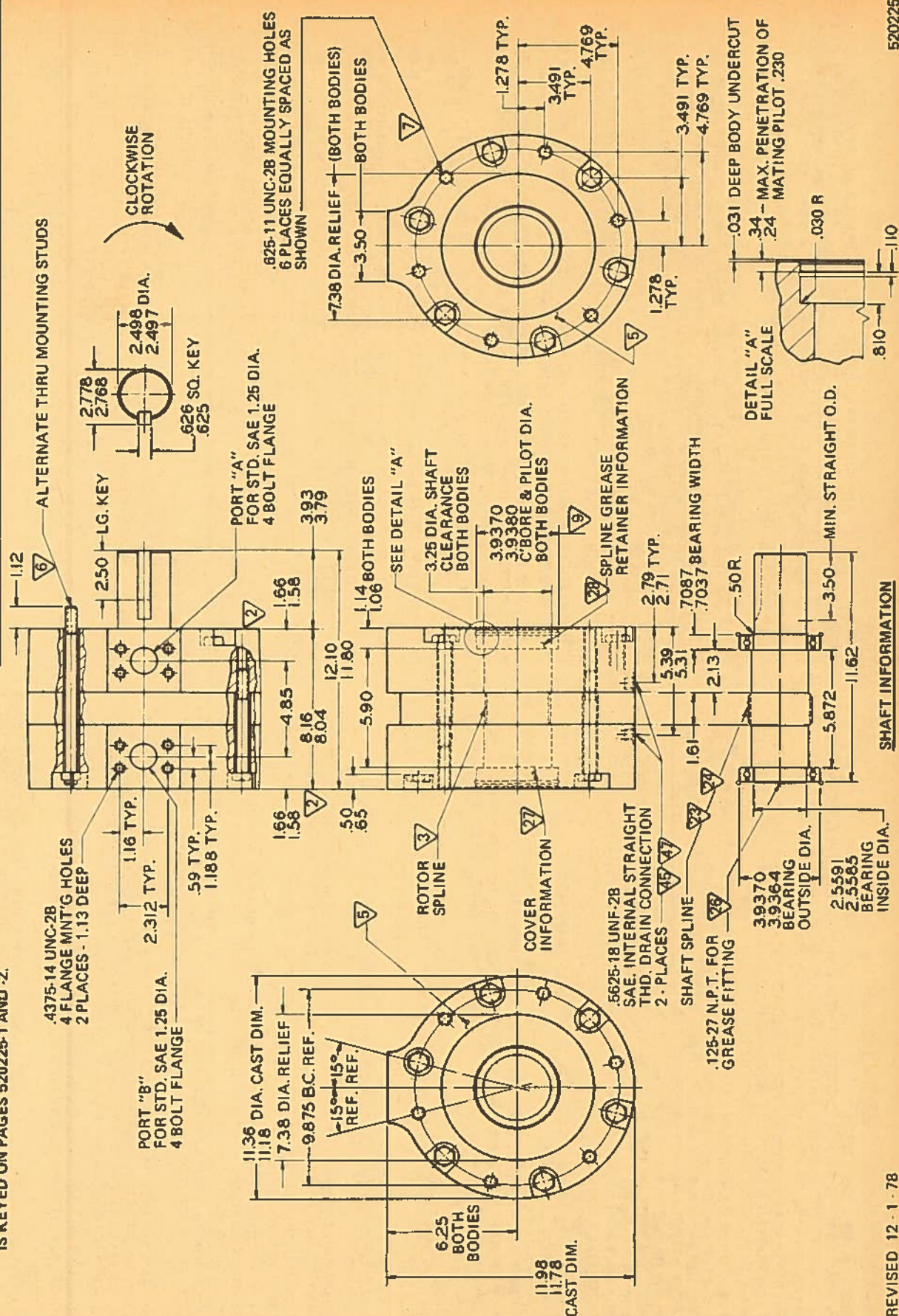




## HYDRAULIC VANE MOTOR

**MODEL SERIES MHT-50 • 30  
HIGH TORQUE • LOW SPEED  
FIXED DISPLACEMENT**

**THE NUMBERED TRIANGLES POINT OUT AREAS OF THE MOTOR WHERE SPECIFIC INFORMATION IS KEYED ON PAGES 520225-1 AND -2.**



REvised 12-1-78

### SHAFT INFORMATION

520225



## GENERAL DATA

MHT-50-R-30 IS A HIGH TORQUE, LOW-SPEED VANE MOTOR. THIS UNIT IS CAPABLE OF SMOOTH SPEEDS THROUGHOUT ITS ENTIRE PRESSURE AND SPEED RANGE. IT WILL PERFORM EQUALLY WELL IN EITHER DIRECTION OF ROTATION. A SYSTEM RELIEF VALVE IS REQUIRED.

## ROTATION

FLUID TO PORT A GIVES CW ROTATION.  
FLUID TO PORT B GIVES CCW ROTATION.

## RATINGS

THEORETICAL DISPLACEMENT.....	38 IN. <sup>3</sup> /REV.
THEORETICAL OUTPUT TORQUE.....	50 LB.-FT.
CASE DRAIN PORT PRESSURE.....	0 TO 25 PSI MAX.
SPEED RANGE AT UP TO 3000 PSI DIFFERENTIAL.....	0 TO 200 RPM
SPEED RANGE AT UP TO 2000 PSI DIFFERENTIAL.....	0 TO 350 RPM
MAXIMUM PEAK DIFFERENTIAL PRESSURE AT STALL.....	4000 PSI
MAXIMUM PRESSURE TO INLET OR OUTLET PORT.....	4000 PSI
MAXIMUM SUM OF PRESSURE AT INLET & OUTLET PORTS.....	4000 PSI

## BEARING DATA

BEARING CAPACITY (RADIAL OR AXIAL)..... 5280 LBS. AFBMA @ 33-1/3 RPM,  
500 HOURS 8-10 LIFE, 2525 LBS. @ 50 RPM, 15000 HOURS AVERAGE LIFE  
(UNRELATED TO MOTOR LIFE).

PERFORMANCE DATA FOR SPECIFIC APPLICATIONS AVAILABLE ON REQUEST  
FROM YOUR SPERRY VICKERS APPLICATION ENGINEER.

APPROXIMATE INERTIA OF MHT ROTATING GROUPS

WITHOUT SHAFT.....	145 LB.-IN. <sup>2</sup>	38 LB.-IN. SEC. <sup>2</sup>
WITH SHAFT.....	162 LB.-IN. <sup>2</sup>	42 LB.-IN. SEC. <sup>2</sup>

## BRACKING

THIS MOTOR MAY BE USED AS A BRAKE AT ANY SPEED AND PRESSURE  
PERMISSIBLE BY MOTOR RATINGS.

## CONVERSION

A BASIC MHT-50-R-1-30 BECOMES A MHT-50-N1-30 BY OMITTING TWO BEARINGS  
379974, TWO SNAP RINGS 380104, AND SHAFT 380094.

## WEIGHT LBS. (APPROX.)

WITHOUT SHAFT.....	180
WITH SHAFT.....	200

## MOUNTING

1. MOTOR HOUSING WILL ACCEPT NO AXIAL LOADING EXCEPT AT 9.875  
BOLT CIRCLE.

2. CUSTOMER MOUNTING SURFACE SHALL BE FLAT WITHIN .001 IN. AND  
PERPENDICULAR TO AXIS WITHIN .001 TIR.

3. THE SPLINED ROTOR WILL NOT ACCEPT ANY SHAFT-TRANSLATION,  
(SLIDING AXIALLY THRU SPLINE).

4. IF THE SHAFT MUST ABSORB AXIAL FORCES, PRELOADING WILL BE  
REQUIRED TO PREVENT ANY TRANSLATION. CONSULT SPERRY VICKERS  
APPLICATION ENGINEER.

5. IF THE APPLICATION REQUIRES THE MOUNTING FACE TO BE SEALED, AN  
AREA HAS BEEN PROVIDED FOR USE WITH A 7.75 I.D. "O" RING SUCH AS  
SPERRY VICKERS 192412.

6. MOTORS MAY BE SUPPLIED WITH THREADS DRILLED OUT OF MOUNTING  
SURFACE BODY FOR THROUGH MOUNTING WITH STANDARD STUDS OR  
SCREWS. IF REQUIRED, TORQUE TO 125 ±5 LB. FT. OILED. THRU STUDS  
NOT INCLUDED. S13 - THREADS DRILLED FROM SHAFT END BODY; S18 -  
FROM HEAD END BODY.

7. CONVENTIONAL MOUNTING IS WITH SIX SCREWS THRU BACK OF MOUNT-  
ING PLATE, 1.75 MAX. INTO MOTOR. TORQUE TO 60-70 LB.-FT. OILED.

8. MOTOR MOUNTING ORIENTATION IS UNRESTRICTED.



PILOT MUST BE A NONBINDING SLIP FIT, AND SHALL NOT EXCEED .230  
MAX. INTO MOTOR.

## SHAFT DATA

22. SHAFT DESIGN MUST PROVIDE SPLINE GREASE RETENTION. SPLINE IS  
NOT LUBRICATED BY SYSTEM FLUID. CUSTOMER SHAFT NEEDS NO SHAFT  
SEAL SURFACE FOR SYSTEM FLUID RETENTION.



23. SHAFT SPLINE MUST SLIP FIT INTO ROTOR.

## SHAFT DATA -

EXTERNAL INVOLUTE SPLINE	FILLET RADII - .020 REF.
FILLET ROOT - SIDE FIT	CIRCULAR TOOTH THICKNESS -
PITCH DIAMETER - 3.0000 REF.	.0943 MAX. ACT. REF.
BASE DIAMETER - 2.5981 REF.	.0929 MIN. ACT.
NO. OF TEETH - 48	.0962 MAX. EFF.
DIAMETRAL PITCH - 16/32	.0948 MIN. EFF. REF.
PRESSURE ANGLE - 30°	MEASUREMENT OVER .1200 DIA.
FORM DIAMETER - 2.9315	PINS
MAJOR DIAMETER - 3.0625/3.0575	3.1814 REF. MAX.
MINOR DIAMETER - 2.8750/2.8640	3.1791 REF. MIN.



24. WHEN DISASSEMBLING OR INSTALLING A SHAFT, THERE SHALL BE NO  
BINDING AND NO AXIAL FORCE APPLIED.

25. WITH A SHAFTLESS ASSEMBLY, THE CUSTOMER SHAFT SHALL PROVIDE  
ITS OWN BEARINGS, AND CENTER THE ROTOR WITH .004 TIR CON-  
TRICTY TO THE PILOT DIAMETERS.



26. THE SHAFT SPLINE SHOULD BE PACKED WITH FIBROUS WHEEL-BEARING  
GREASE AT SIX MONTH INTERVALS, OR SOONER IF OPERATION IS AT  
HIGH TEMPERATURE. A STANDARD 1/8 NPT GREASE FITTING MAY BE IN-  
STALLED AT THE END OF THE SHAFT FOR THIS PURPOSE. (NOT SUPPLIED).



27. A COVER MAY BE MADE TO SEAL OFF SHAFTLESS MODELS AT THIS  
LOCATION. SEE DESIGN ASSISTANCE SKETCH 23511-K. THE COVER HAS  
PROVISION FOR A 1/8 NPT GREASE FITTING. USE WITH "O" RING  
154094 AND SNAP RING 380104 OR EQUIVALENT. (COVER 23511-K NOT  
MANUFACTURED BY SPERRY VICKERS - FOR CUSTOMER INFORMATION  
ONLY.)



28. IF CUSTOMER INSTALLATION USES NO BEARINGS IN THE MOTOR, SPLINE  
GREASE RETENTION MAY BE OBTAINED BY USING A SHAFT SEAL ADAP-  
TER MOUNTED IN THE BEARING BORE WITH "O" RING 154094 AND SNAP  
RING 380104 OR EQUIVALENT. SEE DESIGN ASSISTANCE SKETCH 23512-K  
FOR ADAPTER. SUGGESTED SHAFT SEAL SIZE IS 2.53 I.D. (ADAPTER NOT  
MANUFACTURED BY SPERRY VICKERS - FOR CUSTOMER INFORMATION  
ONLY).

41.

## FLUIDS

PETROLEUM OILS - ANTIWEAR TYPE INDUSTRIAL HYDRAULIC OILS OR  
AUTOMOTIVE CRANKCASE OILS HAVING LETTER DESIGNATIONS SC, SD,  
OR SE (SEE DATA SHEET 1-286-S).

RUNNING VISCOSITY RANGE 70 TO 250 SUS. OPERATING TEMPERATURE  
120° F RECOMMENDED, 180° F USUAL MAXIMUM.

FOR DETAILS, SEE HYDRAULIC OIL RECOMMENDATIONS FOR INDUSTRIAL  
MACHINERY, DATA SHEET 1-286-S IN SECTION L OF CATALOGUE.

WATER GLYCOLS - SELECT FLUIDS WITH AN OPERATING VISCOSITY OF  
THE PETROLEUM OIL DESCRIBED ABOVE. RECOMMENDED MAXIMUM  
TEMPERATURE 130° F.

SYNTHETIC FIRE RESISTANT FLUIDS - PHOSPHATE ESTERS AND THEIR  
BLENDS WITH OPERATING VISCOSITY OF THE PETROLEUM OIL DESCRIBED  
ABOVE. THESE FLUIDS ARE GENERALLY COMPATIBLE WITH FLUORO-  
CARBON AND SILICONE ELASTOMERS. ADD F3 TO THE MODEL NUMBER.



# SPERRY VICKERS HYDRAULIC VANE MOTOR

MODEL SERIES MHT-50\*-30  
HIGH TORQUE - LOW SPEED  
FIXED DISPLACEMENT

## CIRCUIT

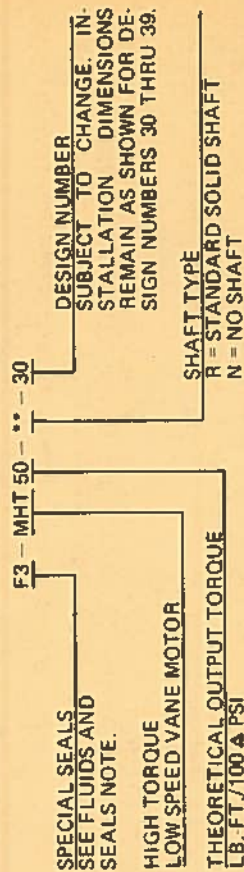
42. FLUID TEMPERATURE. .... 120° F. TYP. TO 180° F. MAX.
43. FLUID FILTRATION. .... 35 MICRONS ABSOLUTE OR FINER
44. CIRCUIT DESIGN SHOULD PROTECT MOTOR FROM PRESSURE SURGES AND/OR CAVITATION.
45. DRAIN OUTLET FLOW LINE MUST BE UNRESTRICTED AND SIZED SUCH THAT CASE PRESSURE AT MOTOR NEVER EXCEEDS RATINGS. EITHER DRAIN OUTLET MAY BE USED; LEAVE OTHER PLUGGED. CONNECT BELOW OIL LEVEL.
46. INTERMITTENT (15 MINUTES OR LESS) UNLOADED RUNNING IS PERMITTED AFTER PROPER START AND WARM UP, TO 200 RPM.
47. CASE OUTLET FLOW MUST BE CHECKED FOR MINIMUM OF .05 GPM. IF NECESSARY, CASE FLOW MAY BE INCREASED BY BACK PRESSURE AT THE MOTOR OUTLET PORT.
48. THERMAL SHOCKS IN EXCESS OF 50°F. ARE NOT RECOMMENDED. WHEN MOTOR IS COLD AND OIL IS HOT, START AND STOP MOTOR UNTIL TEMPERATURES ARE EQUALIZED. FOR MORE COMPLETE INFORMATION ON START-UP, PLEASE CONTACT YOUR LOCAL SPERRY VICKERS REPRESENTATIVE.

## NOTE:

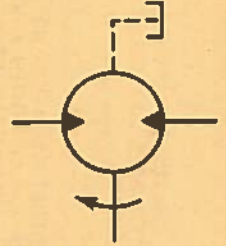
IT IS GOOD PRACTICE TO LUBRICATE THE INTERNAL PARTS OF THESE NEW UNITS WITH HYDRAULIC FLUID BEFORE START-UP. ADD THE HYDRAULIC FLUID USED, TO THE INLET, OUTLET, OF THE MHT MOTORS PRIOR TO STARTING.

MOTOR MOUNTING ORIENTATION IS UNRESTRICTED AS TO PORT LOCATION AND MOUNTING FACE. THE SHAFT MAY PROTRUDE FROM EITHER BODY.

## MODEL CODE



STANDARD GRAPHICAL SYMBOL  
FOR FLUID POWER DIAGRAMS





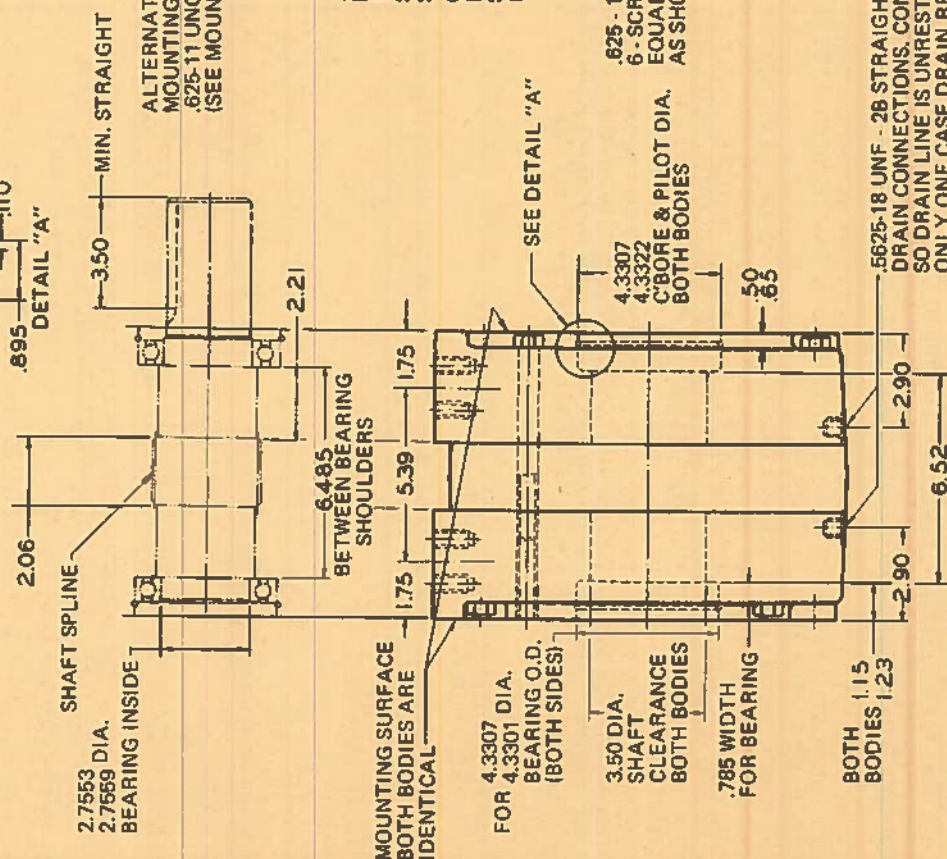
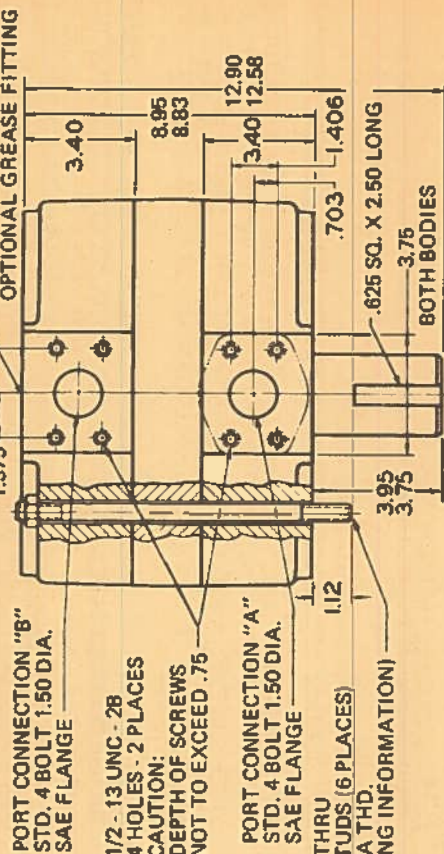
# SPERRY VICKERS

## HYDRAULIC VANE MOTORS

MODEL SERIES MHT-70 AND MHT-90  
HIGH TORQUE - LOW SPEED  
FIXED DISPLACEMENT

.34/.24 - MAX. PENETRATION  
OF MATING PILOT: .230

.03 MIN. DEEP  
BODY U' CUT



SPERRY VICKERS  
TROY, MICHIGAN 48084

VANE  
MOTOR

THEORETICAL TORQUE  
IN. LBS./100 PSI  
MHT-70 840  
MHT-90 1080

THEORETICAL DISPLACEMENT  
CU. IN./REV.  
MHT-70 52.8  
MHT-90 67.9

0 TO 300 RPM  
SPEED RANGE

DWG. NO.  
520230

REVISED 12-1-78

520230



## MOUNTING AND APPLICATION INFORMATION

### MODEL MHT-70 AND MHT-90-N1-12 - SHAFTLESS

WITH A SHAFTLESS ASSEMBLY, CUSTOMER SHAFT SHALL PROVIDE ITS OWN BEARINGS, AND CENTER THE ROTOR WITHIN .004 T.I.R. CONCENTRICITY TO THE PILOT DIAMETERS. (SHAFTLESS MODELS HAVE NO BEARINGS.)

CUSTOMER'S SHAFT DESIGN MUST PROVIDE FOR SPLINE GREASE RETENTION. SPLINE IS NOT LUBRICATED BY SYSTEM FLUID. CUSTOMER'S SHAFT NEEDS NO SHAFT SEAL SURFACE FOR SYSTEM FLUID RETENTION.

IF CUSTOMER INSTALLATION USES NO BEARINGS IN THE MOTOR, SPLINE GREASE RETENTION MAY BE OBTAINED BY USING A SHAFT SEAL ADAPTER MOUNTED IN THE BEARING BORE WITH "O" RING 154097 AND SNAP RING 351823 OR EQUIVALENT. SEE DESIGN ASSISTANCE SKETCH 23220-K FOR ADAPTER. SUGGESTED SHAFT SEAL SIZE IS 2.75 I.D. (ADAPTER NOT MANUFACTURED BY SPERRY VICKERS - FOR CUSTOMER INFORMATION ONLY.)

A COVER MAY BE MADE TO SEAL OFF SHAFTLESS MODELS AT THIS LOCATION. SEE DESIGN ASSISTANCE SKETCH 23221-K. THE COVER HAS A PROVISION FOR A 1/8 NPT GREASE FITTING. USE WITH "O" RING P/N 154097 AND SNAP RING 351823 OR EQUIVALENT. (COVER 23221-K NOT MANUFACTURED BY SPERRY VICKERS - FOR CUSTOMER INFORMATION ONLY.)

### SHAFT SPLINE DATA

#### EXTERNAL INVOLUTE SPLINE

##### FILLET ROOT - SIDE FIT

PITCH DIA.	3.2500 REF.
BASE DIA.	2.8146 REF.
NO. OF TEETH	39
DIAMETRAL PITCH	12/24
PRESSURE ANGLE	30°
FORM DIA.	3.1602
MAJOR DIA.	3.3333/3.3283
MINOR DIA.	3.1000/3.0870
FILLET RADIUS	.034 REF.
CIRCULAR TOOTH THICKNESS	.1262 MAX. ACT. REF. .1247 MIN. ACT.
MEASUREMENT OVER .1600 PINS.	.1282 MAX. EFF. REF. .1267 MIN. EFF. REF. 3.4895 MAX. REF. 3.4870 MIN. REF.

WHEN INSTALLING OR DISASSEMBLING A SHAFT, THE SPLINE MUST HAVE A SLIP FIT INTO ROTOR. THERE SHALL BE NO BINDING AND NO AXIAL FORCE APPLIED.

### MODEL MHT-70 AND MHT-90-N1 & R1-12

CUSTOMER MOUNTING SURFACE SHALL BE FLAT WITHIN .001 IN. AND PERPENDICULAR TO AXIS WITHIN .001 TIR.

HOUSING WILL NOT ACCEPT EXTERNAL AXIAL LOADING EXCEPT AT 10.50 BOLT DIAMETER.

ROTOR WILL NOT TAKE SHAFT TRANSLATION (SLIDING AXIALLY THRU SPLINE). SHAFT SPLINE SHOULD BE PACKED WITH FIBROUS WHEEL BEARING GREASE AT SIX MONTH INTERVALS, OR SOONER IF OPERATION IS AT HIGH TEMPERATURE. A STANDARD 1/8NPT GREASE FITTING MAY BE INSTALLED AT THE END OF THE SHAFT FOR THIS PURPOSE. (NOT SUPPLIED)

SYSTEM CONNECTION PADS ARE FOR USE WITH SAE 4-BOLT FLANGES. REFER TO INSTALLATION DRAWING I-250700 FOR INFORMATION REGARDING VICKERS FL1 SERIES SAE 4-BOLT FLANGES.

IF APPLICATION REQUIRES THAT MOUNTING FACE BE SEALED, A SEALING AREA HAS BEEN PROVIDED FOR 8.50 I.D. "O" RING.

MOTORS MAY BE SUPPLIED WITH THREADS DRILLED OUT OF MOUNTING SURFACE BODY FOR THROUGH MOUNTING WITH STANDARD STUDS OR SCREWS IF REQUIRED. TORQUE TO 125 ±5 LB. FT. OILED. THRU STUDS NOT INCLUDED. S13 - THREADS DRILLED FROM SHAFT END BODY; S18 - FROM HEAD END BODY.

IF THE SHAFT MUST ABSORB AXIAL FORCES, PRELOADING WILL BE REQUIRED TO PREVENT ANY TRANSLATION. (CONSULT SPERRY VICKERS APPLICATION ENGINEER.) CONVENTIONAL MOUNTING IS WITH SIX SCREWS THRU BACK OF MOUNTING PLATE, 1.75 MAX. INTO MOTOR. TORQUE TO 60-70 LB.-FT. OILED.

PILOT MUST BE A NON-BINDING SLIP FIT, AND SHALL NOT EXCEED .230 MAX. INTO MOTOR.

CASE OUTLET FLOW LINE MUST BE UNRESTRICTED AND SIZED SUCH THAT CASE PRESSURE AT MOTOR NEVER EXCEEDS RATINGS. EITHER CASE OUTLET MAY BE USED, LEAVE OTHER PLUGGED.

### GENERAL DATA

THE MHT-70 AND MHT-90 ARE HIGH-TORQUE, LOW-SPEED VANE MOTORS. THESE UNITS ARE CAPABLE OF SMOOTH MOTORING SPEEDS THROUGHOUT THEIR ENTIRE PRESSURE AND SPEED RANGE. THEY WILL PERFORM WELL AT MAXIMUM RATED RPM IN EITHER DIRECTION OF ROTATION.

FLUID TO PORT "A" GIVES CW ROTATION VIEWED FROM PORT "A" END AND TO "B" GIVES CCW ROTATION. IN THE EVENT OF HYDRAULIC SURGE PRESSURES APPLIED TO, OR GENERATED BY THE MOTOR, RELIEF PROTECTION MUST BE PROVIDED IN THE CIRCUIT TO PREVENT THESE SURGES FROM EXCEEDING THE MAXIMUM PRES-SURE RATING. THE INLET MUST BE PROVIDED WITH A SUFFICIENT AMOUNT OF OIL TO PREVENT CAVITATION IN OVERRUNNING LOADS. GENERALLY, BRAKING APPLI-CATIONS ARE NOT APPROVED: CONSULT SPERRY VICKERS APPLICATION ENGINEER.

### INSTALLATION

FILTRATION..... 35 MICRONS ABSOLUTE OR FINER

### FLUIDS

PETROLEUM OILS - ANTIWEAR TYPE INDUSTRIAL HYDRAULIC OILS OR AUTOMOTIVE CRANKCASE OILS HAVING LETTER DESIGNATIONS SC, SD, OR SE (SEE DATA SHEET I-286 S).

RUNNING VISCOSITY RANGE 70 TO 250 SUS. OPERATING TEMPERATURE 120° F RECOMMENDED, 180° F USUAL MAXIMUM.

FOR DETAILS, SEE HYDRAULIC OIL RECOMMENDATIONS FOR INDUSTRIAL MA-CHINERY, DATA SHEET I-286-S IN SECTION L OF CATALOGUE.

WATER GLYCOLS - SELECT FLUIDS WITH AN OPERATING VISCOSITY OF THE PETRO-LEUM OIL DESCRIBED ABOVE. RECOMMENDED MAXIMUM TEMPERATURE 130° F.

SYNTHETIC FIRE RESISTANT FLUIDS - PHOSPHATE ESTERS AND THEIR BLENDS WITH OPERATING VISCOSITY OF THE PETROLEUM OIL DESCRIBED ABOVE. THESE FLUIDS ARE GENERALLY COMPATIBLE WITH FLUOROCARBON AND SILICONE ELASTOMERS. ADD F3 TO THE MODEL NUMBER.

### RATINGS

	MHT-70	MHT-90
THEORETICAL DISPLACEMENT.....	52.8 CU. IN./REV. (REF. 294)	67.9 CU. IN./REV. (REF. 294)
	GALLONS/REV.)	GALLONS/REV.)
MAXIMUM ROTATING Δ PRESSURE.....	3000 PSI.	3000 PSI
MAXIMUM PEAK DIFFERENTIAL PRESSURE AT STALL.....	4000 PSI	4000 PSI
MAXIMUM PRESSURE TO INLET OR OUTLET PORT.....	4000 PSI	4000 PSI
MAXIMUM SUM OF PRESSURE AT INLET & OUTLET PORTS.....	4000 PSI	4000 PSI
MAXIMUM OPERATING SPEED		
@ 3000 Δ PSI (CONTINUOUS).....	0 - 150 RPM	0 - 150 RPM
@ 2000 Δ PSI (CONTINUOUS).....	0 - 300 RPM	0 - 300 RPM
THEORETICAL TORQUE / 100 Δ PSI.....	840 IN. LBS. (REF. 70 FT. LBS.)	1080 IN. LBS. (REF. 90 FT. LBS.)

520230-1



TEMPERATURE: (FLUID AT MOTOR INLET)..... 120° F. TYP. TO 180° MAX.  
EXCEPT WATER GLYCOL..... 120° MAX.

CASE DRAIN PRESSURE AT THE MOTOR CASE PORT..... 0 TO 25 PSI MAX.

**BEARING DATA**  
BEARING CAPACITY (RADIAL OR AXIAL)..... 8560 LBS. AF8MA @ 33-1/3 RPM,  
500 HOURS B-10 LIFE, 3140 LBS. @ 50 RPM, 15000 HOURS AVERAGE LIFE (UNRELATED  
TO MOTOR LIFE).

PERFORMANCE DATA FOR SPECIFIC APPLICATIONS AVAILABLE ON REQUEST FROM  
YOUR SPERRY VICKERS APPLICATION ENGINEER.

APPROXIMATE INERTIA OF MHT ROTATING GROUPS  
WITHOUT SHAFT..... 262 LB.-IN.<sup>2</sup>..... 68 LB.-IN.-SEC.<sup>2</sup>  
WITH SHAFT..... 286 LB.-IN.<sup>2</sup>..... 74 LB.-IN.-SEC.<sup>2</sup>

INTERMITTENT (15 MINUTES OR LESS) UNLOADED RUNNING IS PERMITTED AFTER  
PROPER START AND WARM UP, TO 200 RPM.

THERMAL SHOCKS IN EXCESS OF 50°F. ARE NOT RECOMMENDED. WHEN MOTOR IS  
COLD AND OIL IS HOT, START AND STOP MOTOR UNTIL TEMPERATURES ARE  
EQUALIZED.

**CAUTION**

CASE OUTLET FLOW SHOULD BE UNRESTRICTED AND CHECKED TO ENSURE SOME  
FLOW. THERE SHOULD BE A MINIMUM OF .05 GPM TOTAL. CONTACT SPERRY VICKERS  
REPRESENTATIVE WHEN CASE FLOW IS BELOW MINIMUM. CASE FLOW MAY BE IN-  
CREASED BY APPLYING BACK PRESSURE TO MOTOR RETURN PORT.

MOTOR MOUNTING ORIENTATION IS UNRESTRICTED AS TO PORT LOCATION AND  
MOUNTING FACE. THE SHAFT MAY PROTRUDE FROM EITHER BODY.

**STARTING**

IT IS GOOD PRACTICE TO LUBRICATE THE INTERNAL PARTS OF THESE NEW UNITS  
WITH HYDRAULIC FLUID BEFORE START-UP. ADD THE HYDRAULIC FLUID USED, TO  
THE INLET, OUTLET OR CASE OF THE MHT MOTORS PRIOR TO STARTING. FOR MORE  
COMPLETE INFORMATION ON START-UP, PLEASE CONTACT YOUR LOCAL SPERRY  
VICKERS REPRESENTATIVE.

**WEIGHT LBS. (APPROX.)**

WITH SHAFT..... 240  
WITHOUT SHAFT..... 210

**MODEL CODE**

SPECIAL SEALS  
SEE FLUIDS AND SEALS NOTE  
(OMIT IF NOT REQUIRED)

F3 - M HT 90 - R 1 - 12

DESIGN  
SHAFT VARIATIONS

MOTOR

SHAFT TYPE  
R - SOLID  
N - NONE

HIGH TORQUE TYPE

MOTOR SIZE - THEORETICAL OUTPUT  
TORQUE FT. LB. PER HUNDRED PSI  
70 - 70 SERIES  
90 - 90 SERIES







## GENERAL DATA

THE MHT-70/35/35 & MHT-90/45/45 ARE MULTI-DISPLACEMENT, BI-DIRECTIONAL HIGH-TORQUE, LOW-SPEED VANE MOTORS. THESE UNITS ARE CAPABLE OF SMOOTH SPEEDS THROUGHOUT THEIR ENTIRE PRESSURE AND SPEED RANGE. THE MULTI-DISPLACEMENT FEATURE PROVIDES FOR SELECTION OF TWO SPEED OPERATIONS FOR A GIVEN FLOW, AND TWO TORQUE CAPACITIES CORRESPONDING TO THE SPEEDS. SEE RATINGS BELOW AND ITEM 49.

## ROTATION

FLUID TO PORTS "A" GIVES CW ROTATION.  
FLUID TO PORT "B" GIVES CCW ROTATION.

## RATINGS

### THEORETICAL DISPLACEMENT

MHT90/45/45..... 67.9 & 33.9 IN.<sup>3</sup>/REV.  
MHT70/35/35..... 52.8 & 26.4 IN.<sup>3</sup>/REV.

### THEORETICAL OUTPUT TORQUE PER 100 PSI DIFFERENTIAL

MHT90/45/45..... 90 & 45 lbf · ft  
MHT70/35/35..... 70 & 35 lbf · ft

### CASE PRESSURE

MHT90/45/45..... 0 TO 25 PSI MAX.  
MHT70/35/35..... 0 TO 25 PSI MAX.

### MAXIMUM ROTATING PRESSURE

MHT90/45/45..... 3000 PSI  
MHT70/35/35..... 3000 PSI

### MAXIMUM SPEED UP TO 3000 PSI DIFFERENTIAL

MHT90/45/45..... 150 RPM  
MHT70/35/35..... 150 RPM

### MAXIMUM SPEED UP TO 2000 PSI DIFFERENTIAL

MHT90/45/45..... 300 RPM  
MHT70/35/35..... 300 RPM

### MAXIMUM BREAKAWAY PRESSURE (STALL - NO ROTATION)

MHT90/45/45..... 4000 PSI  
MHT70/35/35..... 4000 PSI

### MAXIMUM PRESSURE TO INLET OR OUTLET PORT

MHT90/45/45..... 4000 PSI  
MHT70/35/35..... 4000 PSI

### MAXIMUM SUM OF PRESSURE AT INLET & OUTLET PORTS

MHT90/45/45..... 4000 PSI  
MHT70/35/35..... 4000 PSI

### PERFORMANCE DATA FOR SPECIFIC APPLICATIONS AVAILABLE ON REQUEST FROM YOUR SPERRY VICKERS APPLICATION ENGINEER.

### APPROXIMATE INERTIA OF MHT ROTATING GROUPS

WITHOUT SHAFT..... 262 lbf · in.<sup>2</sup>  
WITH SHAFT..... 288 lbf · in.<sup>2</sup>

## BEARING DATA

BEARING CAPACITY (RADIAL OR AXIAL)..... 6560 LBS. AFBMA @ 33-1/3 RPM,  
500 HOURS 8-10 LIFE, 3140 LBS. @ 50 RPM, 15000 HOURS AVERAGE LIFE  
(UNRELATED TO MOTOR LIFE).

## BRAKING

CONSULT WITH SPERRY VICKERS APPLICATION ENGINEER FOR MODEL SERIES.

WEIGHT LBS. (APPROX.)..... 210  
WITH SHAFT..... 240

## MOUNTING

1 MOTOR HOUSING WILL ACCEPT NO AXIAL LOADING EXCEPT AT 10.50 DIA. BOLT CIRCLE.

2 CUSTOMER MOUNTING SURFACE SHALL BE FLAT WITHIN .001 IN. AND PERPENDICULAR TO AXIS WITHIN .001.

3 THE SPLINED ROTOR WILL NOT ACCEPT ANY SHAFT-TRANSLATION, (SLIDING AXIALLY THRU SPLINE).

4 IF THE SHAFT MUST ABSORB AXIAL FORCES, PRELOADING WILL BE REQUIRED TO PREVENT ANY TRANSLATION. (CONSULT SPERRY VICKERS APPLICATION ENGINEER.)

5 IF THE APPLICATION REQUIRES THE MOUNTING FACE TO BE SEALED, AN AREA HAS BEEN PROVIDED FOR USE WITH AN 8.50 ID "O" RING SUCH AS SPERRY VICKERS P/N 154120.

6

MOTORS MAY BE SUPPLIED WITH THREADS DRILLED OUT OF MOUNTING SURFACE BODY FOR THROUGH MOUNTING WITH STANDARD STUDS OR SCREWS, IF REQUIRED. BOLT TORQUE MUST BE 125 ± 5 LBS. FT. OILED. S13 - THREADS DRILLED FROM SHAFT END BODY; S18 - FROM HEAD END BODY.

7

CONVENTIONAL MOUNTING IS WITH SIX .6250-11 - UNC-2A SCREWS THRU BACK OF MOUNTING PLATE, 1.25 MAX. INTO MOTOR. TORQUE TO 60-70 LB.-FT. OILED.

8

MOTOR MOUNTING ORIENTATION IS UNRESTRICTED AS TO PORT LOCATION AND MOUNTING FACE. THE SHAFT MAY PROTRUDE FROM EITHER BODY.

9

MAXIMUM PILOT LENGTH .250 (MUST BE NON-BINDING SLIP FIT).

## SHAFT DATA

### EXTERNAL INVOLUTE SPLINE DATA

FILLET ROOT - SIDE FIT  
MAJOR DIA. - 3.3333/3.3283  
MINOR DIA. - 3.1000/3.0870  
DIAMETRAL PITCH - 12/24  
PITCH DIA. - 3.2500 REF.  
NO. OF TEETH - 39  
PRESSURE-ANGLE - 30°  
BASE DIA. - 2.8146 REF.  
FORM DIA. - 3.1602  
FILLET RADIUS - .034 REF.  
TOOTH THICKNESS -  
MIN. ACT. - .1247  
MAX. ACT. - .1262 (REF.)  
MAX. EFF. - .1282  
MIN. EFF. - .1267 (REF.)  
DIMENSION OVER PINS -  
3.4895/3.4870 REF.  
PIN DIA. - .1600 BASIC

22

SHAFT DESIGN MUST PROVIDE SPLINE GREASE RETENTION. SPLINE IS NOT LUBRICATED BY SYSTEM FLUID. CUSTOMER SHAFT NEEDS NO SHAFT SEAL SURFACE FOR SYSTEM FLUID RETENTION.

23

WHEN DISASSEMBLING OR INSTALLING A SHAFT, THERE SHALL BE NO BINDING AND NO AXIAL FORCE APPLIED TO THE ROTOR.

24

WITH A SHAFTLESS ASSEMBLY, THE CUSTOMER SHAFT SHALL PROVIDE ITS OWN BEARINGS, AND CENTER THE ROTOR WITH .004 TIR CONCENTRICITY TO THE PILOT DIAMETERS.

25

THE SHAFT SPLINE SHOULD BE PACKED WITH FIBROUS WHEEL-BEARING GREASE AT SIX MONTH INTERVALS, OR SOONER IF APPLICATION REQUIRES. A STANDARD 1/8 NPTF GREASE FITTING MAY BE INSTALLED AT THE END OF THE SHAFT FOR THIS PURPOSE. (NOT SUPPLIED WITH STANDARD ASSEMBLY.)

26

A COVER MAY BE MADE TO SEAL OFF SHAFTLESS MODELS AT THIS LOCATION. SEE DESIGN ASSISTANCE SKETCH NO. 23221-K. THE COVER HAS PROVISION FOR A 1/8 NPTF GREASE FITTING. USE WITH "O" RING P/N 154097 SNAP RING 351823 OR EQUIVALENT (COVER 23221-K NOT MANUFACTURED BY SPERRY VICKERS - FOR CUSTOMER INFORMATION ONLY.)

27

IF CUSTOMER INSTALLATION USES NO BEARINGS IN THE MOTOR, SPLINE GREASE RETENTION MAY BE OBTAINED BY USING A SHAFT SEAL ADAPTED TO THE BEARING BORE. SEE DESIGN ASSISTANCE SKETCH NO. 23220-K. USE WITH "O" RING 154097 AND SNAP RING 351823 OR EQUIVALENT. SUGGESTED SHAFT SEAL SIZE IS 2.75 ID. (ADAPTER NOT MANUFACTURED BY SPERRY VICKERS - FOR CUSTOMER INFORMATION ONLY.)



# SPERRY-VICKERS<sup>TM</sup> HYDRAULIC VANE MOTORS MULTI-TORQUE

MODEL SERIES MHT-70/35/35 AND MHT-90/45/45  
HIGH TORQUE - LOW SPEED  
DUAL FIXED DISPLACEMENT

## CIRCUIT

**FLUIDS**  
PETROLEUM OILS - ANTIWEAR TYPE INDUSTRIAL HYDRAULIC OILS OR AUTOMOTIVE CRANKCASE OILS HAVING LETTER DESIGNATIONS SC, SD, OR SE.

RUNNING VISCOSITY RANGE 70 TO 250 SUS. OPERATING TEMPERATURE 120° F RECOMMENDED, 180° F USUAL MAXIMUM.

FOR DETAILS, SEE HYDRAULIC OIL RECOMMENDATIONS FOR INDUSTRIAL MACHINERY, DATA SHEET I-286-S IN SECTION I OF CATALOGUE.

**WATER GLYCOLS** - SELECT FLUIDS WITH AN OPERATING VISCOSITY OF THE PETROLEUM OIL DESCRIBED ABOVE. RECOMMENDED MAXIMUM TEMPERATURE 130° F.

**SYNTHETIC FIRE RESISTANT FLUIDS** - PHOSPHATE ESTERS AND THEIR BLENDS WITH OPERATING VISCOSITY OF THE PETROLEUM OIL DESCRIBED ABOVE. THESE FLUIDS ARE GENERALLY COMPATIBLE WITH FLUORO-CARBON AND SILICONE ELASTOMERS. ADD F3 TO THE MODEL NUMBER.

43. FLUID FILTRATION. .... 35 MICRONS ABSOLUTE OR FINER
44. CIRCUIT DESIGN SHOULD PROTECT MOTOR FROM PRESSURE SURGES AND/OR CAVITATION.

45. CASE OUTLET FLOW LINE MUST BE UNRESTRICTED AND SIZED SUCH THAT CASE PRESSURE AT MOTOR NEVER EXCEEDS RATINGS. EITHER CASE OUTLET MAY BE USED, LEAVE OTHER PLUGGED.

46. INTERMITTENT (15 MINUTES OR LESS) UNLOADED RUNNING IS PERMITTED AFTER PROPER START AND WARM UP, TO 200 RPM.

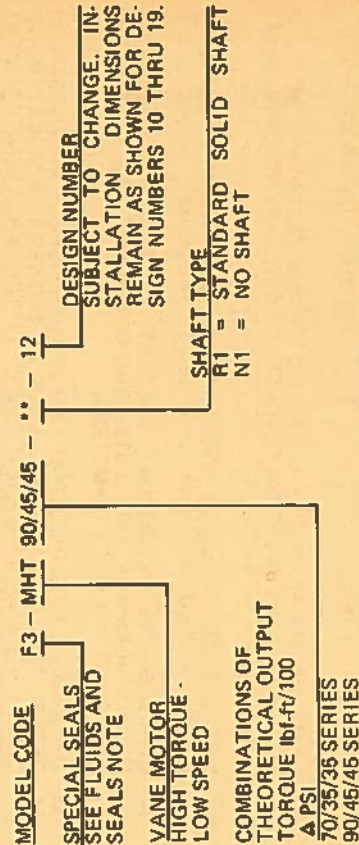
47. CASE OUTLET FLOW MUST BE CHECKED FOR MINIMUM OF .05 GPM. IF NECESSARY, CASE FLOW MAY BE INCREASED BY BACK-PRESSURE AT THE MOTOR OUTLET PORT.

48. THERMAL SHOCKS IN EXCESS OF 50 FAHRENHEIT DEGREES ARE NOT RECOMMENDED. WHEN MOTOR IS COLD AND OIL IS HOT, START AND STOP MOTOR UNTIL TEMPERATURES ARE EQUALIZED.

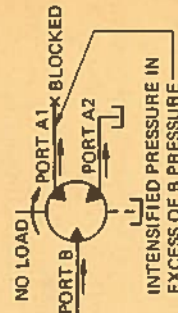
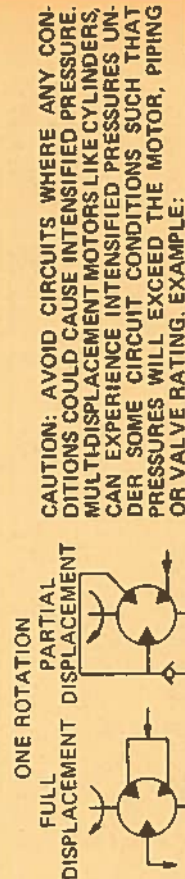
49. FOR MULTI-TORQUE AND MULTI-SPEED OPERATION IT IS PREFERRED THAT THE "B" SINGLE PORT BODY BE USED AS INLET. IF BI-DIRECTIONAL ROTATION IS REQUIRED, USE THE "B" PORT FOR PRIMARY DIRECTION OF ROTATION. WHEN "B" PORT IS INLET THE IDLING "A" PORT MUST BE CONNECTED TO THE "B" PORT. SEE DIAGRAMS BELOW. A1 AND A2 PORT DISPLACEMENT IS 33.9 C.I.R. ON THE MHT-90/45/45 AND 26.4 C.I.R. ON THE MHT-70/35/35. USE OF BOTH "A" PORTS GIVES MAXIMUM DISPLACEMENT OF EACH MODEL.

AT START UP: MAXIMUM START UP VISCOSITY 500 SSU. MOTORS SHOULD BE STARTED UNDER LOAD TO INDUCE CASE ROTOR LUBRICATION FLOW. MINIMUM CASE FLOW UNDER ANY CONDITION SHOULD BE .05 GPM. FOR MORE COMPLETE INFORMATION ON START-UP, PLEASE CONTACT YOUR LOCAL SPERRY VICKERS REPRESENTATIVE.

**NOTE:**  
IT IS GOOD PRACTICE TO LUBRICATE THE INTERNAL PARTS OF THESE NEW UNITS WITH HYDRAULIC FLUID BEFORE START-UP. ADD THE HYDRAULIC FLUID USED, TO THE INLET, OUTLET, OF THE MHT MOTORS PRIOR TO STARTING.



## MOTOR INSTALLATION POSSIBILITIES FOR FULL AND PARTIAL DISPLACEMENT AND BOTH DIRECTIONS OF ROTATION



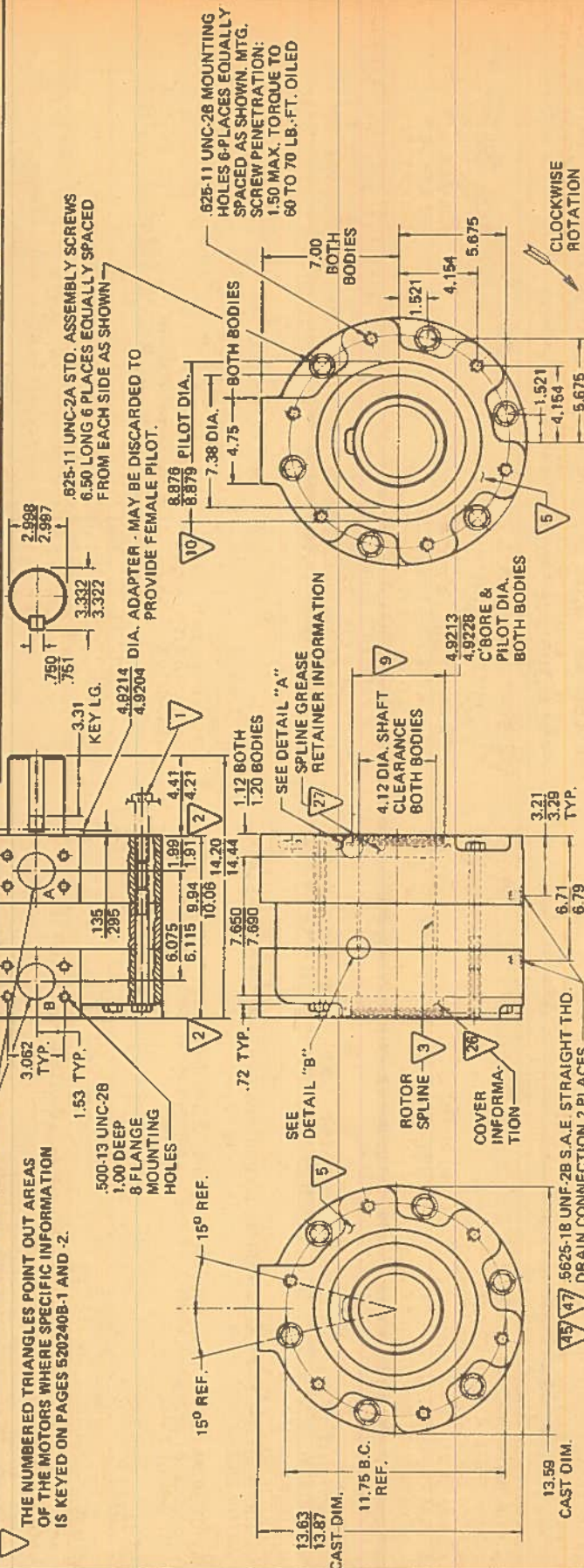
**NOTE:** USE OF CHECK VALVE DEPENDS ON CIRCUIT NEEDS.



# HYDRAULIC VANE MOTOR

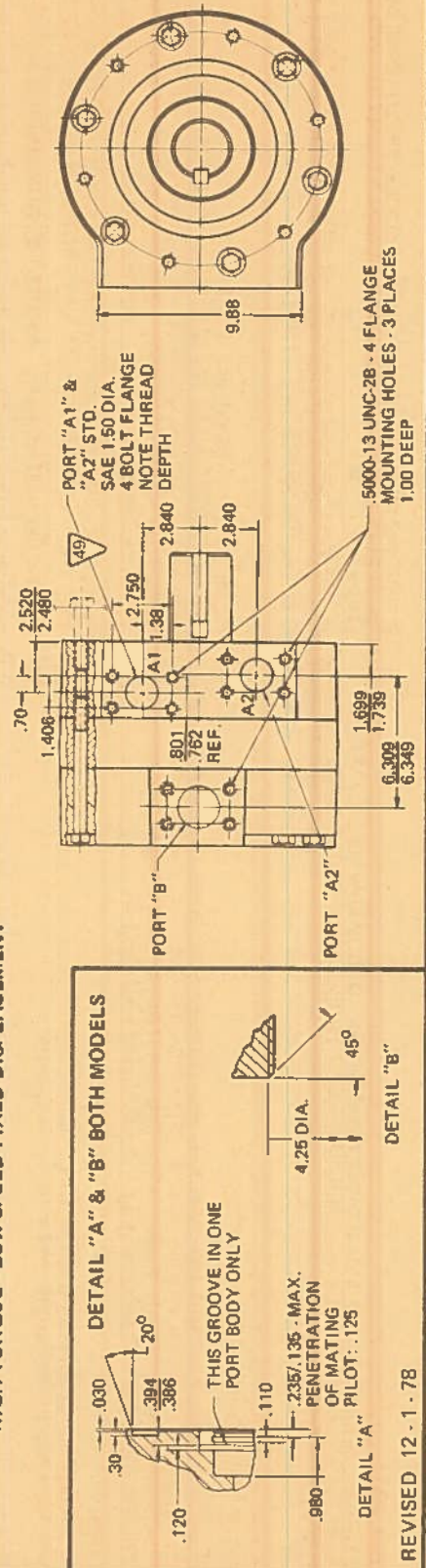


MODEL SERIES MHT-150/130-30  
HIGH TORQUE - LOW SPEED FIXED DISPLACEMENT  
STANDARD - SINGLE DISPLACEMENT



## HYDRAULIC VANE MOTORS MULTI-TORQUE

MODEL SERIES MHT-130/75/55 AND MHT-150/75/55-30 DESIGN  
HIGH TORQUE - LOW SPEED FIXED DISPLACEMENT



SPERRY-VICKERS  
TROY, MICHIGAN 48064

VANE MOTORS  
HIGH TORQUE  
LOW SPEED

THEORETICAL TORQUE  
STD. 130 & 150 LB. FT.  
MULTI 55, 75, 130 & 150 LB. FT.

THEORETICAL DISPLACEMENT  
STD. 98 & 113 CU. IN./REV.  
MULTI 41.5, 56.5, 97 & 113 CU. IN./REV.

SPEED  
RANGE  
0-250

DWG. NO.  
5202408



## GENERAL DATA

THE MHT 150 SERIES MOTORS ARE BI-DIRECTIONAL HIGH-TORQUE LOW SPEED VANE MOTORS. THEY ARE CAPABLE OF SMOOTH SPEEDS THROUGHOUT THEIR ENTIRE PRESSURE AND SPEED RANGES.

THE MHT 130 & 150-30 PROVIDES A SINGLE DISPLACEMENT, ONE SPEED AND ONE TORQUE FOR A GIVEN FLOW AND PRESSURE.

THE MHT-150/75/75 AND MHT-130/75/55 ARE MULTI-TORQUE MOTORS. THE MULTI-DISPLACEMENT FEATURE PROVIDES FOR SELECTION OF TWO OR THREE SPEED OPERATIONS FOR A GIVEN FLOW, AND TWO OR THREE TORQUE CAPACITIES CORRESPONDING TO THE SPEEDS. SEE RATINGS BELOW AND ITEM 49.

## ROTATION

FLUID TO PORTS "A" GIVES CW ROTATION.  
FLUID TO PORT "B" GIVES CCW ROTATION.

## RATINGS

NOMINAL SIZE	150	130	75	55
THEORETICAL DISPLACEMENT (IN. <sup>3</sup> /REV.)	113	98	56.5	41.5
THEORETICAL OUTPUT TORQUE PER 100 PSI DIFFERENTIAL (LB. FT.)	150	130	75	55

DRAIN PRESSURE (PSI) MAX. .... 0-25  
MAXIMUM ROTATING PRESSURE ..... 3000 PSI  
MAXIMUM SPEED AT 3000 PSI DIFFERENTIAL ..... 150 RPM  
MAXIMUM SPEED AT 2000 PSI DIFFERENTIAL ..... 250 RPM  
MAXIMUM BREAKAWAY PRESSURE (STALL - NO ROTATION) ..... 4000 PSI  
MAXIMUM PRESSURE TO INLET OR OUTLET PORT ..... 4000 PSI  
MAXIMUM SUM OF PRESSURE AT INLET & OUTLET PORTS ..... 4000 PSI

PERFORMANCE DATA FOR SPECIFIC APPLICATIONS AVAILABLE ON REQUEST FROM YOUR SPERRY VICKERS APPLICATION ENGINEER.

APPROXIMATE INERTIA OF MHT ROTATING GROUPS  
WITHOUT SHAFT ..... 477 LB.-IN.<sup>2</sup>  
WITH SHAFT ..... 548 LB.-IN.<sup>2</sup>

BEARING DATA  
BEARING CAPACITY (RADIAL OR AXIAL) ..... 8235 LBS. AF8MA @ 33-1/3 RPM,  
500 HOURS 8-10 LIFE, 3940 LBS. @ 50 RPM, 15000 HOURS AVERAGE LIFE (UNRELATED TO MOTOR LIFE).

BRAKING  
THIS MOTOR MAY BE USED AS A BRAKE AT ANY SPEED AND PRESSURE COMBINATION PERMISSIBLE BY MOTOR RATINGS AT FULL DISPLACEMENT ONLY ON SINGLE OR MULTI-TORQUE TYPE.

WEIGHT LBS. (APPROX.) ..... 312  
WITH SHAFT ..... 358

## MOUNTING

1 MOTOR HOUSING WILL ACCEPT NO AXIAL LOADING EXCEPT AT 11.75 DIA. BOLT CIRCLE.

2 CUSTOMER MOUNTING SURFACE SHALL BE FLAT WITHIN .001 IN. AND PERPENDICULAR TO AXIS WITHIN .001 TIR.

3 THE SPLINED ROTOR WILL NOT ACCEPT ANY SHAFT TRANSLATION, (SLIDING AXIALLY THRU SPLINE).

4 IF THE SHAFT MUST ABSORB AXIAL FORCES, PRELOADING WILL BE REQUIRED TO PREVENT ANY TRANSLATION. (CONSULT SPERRY VICKERS APPLICATION ENGINEER.)

5 IF THE APPLICATION REQUIRES THE MOUNTING FACE TO BE SEALED, AN AREA HAS BEEN PROVIDED FOR USE WITH A 9.25 ID "O" RING SUCH AS SPERRY VICKERS P/N 198629 OR EQUIVALENT.

6 MOTORS MAY BE SUPPLIED WITH THREADS DRILLED OUT OF MOUNTING SURFACE BODY FOR THROUGH MOUNTING WITH STANDARD STUDS OR SCREWS, IF REQUIRED. TORQUE TO 125 ± 5 LB. FT. OILED. THRU STUDS NOT INCLUDED. S13 - THREADS DRILLED FROM SHAFT END BODY: S18 - FROM HEAD END BODY.

7 CONVENTIONAL MOUNTING IS WITH .6250-11 UNC-2A SCREWS THRU BACK OF MOUNTING PLATE, 1.50 MAX. INTO MOTOR. (6 PLACES EQUALLY SPACED ON 11.750 DIAMETER B.C. REF.). TORQUE TO 60-70 LB.-FT. OILED.

8 MOTOR MOUNTING ORIENTATION IS UNRESTRICTED AS TO PORT LOCATION AND MOUNTING FACE. THE SHAFT MAY PROTRUDE FROM EITHER BODY.

9 MAXIMUM PILOT LENGTH .130 (MUST BE NON-BINDING SLIP FIT).

10 MAXIMUM PILOT LENGTH .250 (MUST BE NON-BINDING SLIP FIT).

11 DOWEL HOLES .6254/6264 DIA. 1.00 DEEP MAY BE ADDED BY CUSTOMER AT ANY TWO (180° APART) OF THESE SIX MOUNTING HOLES IF REQUIRED.

## SHAFT DATA

21 CUSTOMER SHAFT DESIGN MUST PROVIDE SPLINE GREASE RETENTION. SPLINE IS NOT LUBRICATED BY SYSTEM FLUID. CUSTOMER SHAFT NEEDS NO SHAFT SEAL SURFACE FOR SYSTEM FLUID RETENTION.



## SHAFT SPLINE DATA -

EXTERNAL INVOLUTE SPLINE

FILLET ROOT - SIDE FIT

PITCH DIA. - 4.0000 REF.

BASE DIA. - 3.4841 REF.

NO. OF TEETH - 40

DIAMETRAL PITCH - 10/20

PRESSURE ANGLE - 30°

FORM DIA. - 3.8920

MAJOR DIA. - 4.1000/4.0950

MINOR DIA. - 3.8200/3.8050

FILLET RADII - .040 REF.

CIRCULAR TOOTH THICKNESS -

.1523 MAX. ACT. REF.

.1508 MIN. ACT.

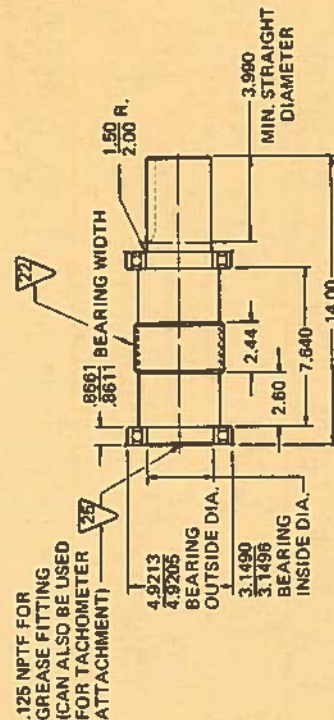
.1544 MAX. EFF.

.1529 MIN. EFF. REF.

MEASUREMENT OVER .1920 PINS:

4.2921 MAX. REF.

4.2896 MIN. REF.





- 23 WHEN DISASSEMBLING OR INSTALLING A SHAFT, THERE SHALL BE NO BINDING AND NO AXIAL FORCE APPLIED TO THE ROTOR.
- 24 WITH A SHAFTLESS ASSEMBLY, THE CUSTOMER SHAFT SHALL PROVIDE ITS OWN BEARINGS, AND CENTER THE ROTOR WITH .004 TIR CONCENTRICITY TO THE PILOT DIAMETERS.

25 THE SHAFT SPLINE SHOULD BE PACKED WITH FIBROUS WHEEL-BEARING GREASE AT SIX MONTH INTERVALS, OR SOONER IF APPLICATION REQUIRES. A STANDARD 1/8 NPTF GREASE FITTING MAY BE INSTALLED AT THE END OF THE SHAFT FOR THIS PURPOSE. (NOT SUPPLIED WITH STANDARD ASSEMBLY.)

26 A COVER MAY BE MADE TO SEAL OFF SHAFTLESS MODELS AT THIS LOCATION. SEE DESIGN ASSISTANCE SKETCH NO. 23127-K. THIS COVER HAS PROVISION FOR A 1/8 NPTF GREASE FITTING. USE WITH "O" RING P/N 275965 AND SNAP RING 373434 OR EQUIVALENT. (COVER 23127-K NOT MANUFACTURED BY SPERRY VICKERS - FOR CUSTOMER INFORMATION ONLY.)

27 IF CUSTOMER INSTALLATION USES NO BEARINGS IN THE MOTOR, SPLINE GREASE RETENTION MAY BE OBTAINED BY USING A SHAFT SEAL ADAPTER MOUNTED IN THE BEARING BORE WITH "O" RING 275965 AND SNAP RING 373434 OR EQUIVALENT. SEE DESIGN ASSISTANCE SKETCH 23126-K FOR ADAPTER. SUGGESTED SHAFT SEAL SIZE 3.13 ID (ADAPTER 23126-K NOT MANUFACTURED BY SPERRY VICKERS - FOR CUSTOMER INFORMATION ONLY.)

# **CIRCUIT**

## **41 FLUIDS**

**PETROLEUM OILS** - SELECT ANTIWEAR TYPE INDUSTRIAL HYDRAULIC OILS OR AUTOMOTIVE CRANKCASE OILS WITH A NOMINAL VISCOSITY OF 150 TO 315 SUS AT 100° F. AND HAVING LETTER DESIGNATION "SC, SD, OR SE" PER SAE TECHNICAL REPORT J183a. OPERATING VISCOSITY RANGE IS 70 TO 250 SUS. OPERATING TEMPERATURE OF 120° F. TYPICAL TO 180° F. MAXIMUM IS RECOMMENDED. REFER TO DATA SHEET I-288-S (SECTION L) FOR HYDRAULIC OIL RECOMMENDATIONS.

**WATER CONTAINING FLUIDS** - WATER GLYCOLS (NOT WATER-IN-OIL EMULSIONS) AS PRODUCED BY RESPONSIBLE SOURCES FOR RATINGS GIVEN HEREIN, ARE RECOMMENDED. SELECT FLUIDS WITH A VISCOSITY AS CLOSE AS POSSIBLE TO THAT OF PETROLEUM OIL DESCRIBED ABOVE. IT IS RECOMMENDED THAT TEMPERATURES FOR WATER BASE FLUIDS BE LIMITED TO A MAXIMUM OF 130° F.

**SYNTHETIC FIRE RESISTANT FLUIDS** - PHOSPHATE ESTERS AND ITS BLENDS AS PRODUCED BY RESPONSIBLE SOURCES FOR RATINGS GIVEN HEREIN AS RECOMMENDED. SELECT FLUIDS WITH VISCOSITY AS CLOSE AS POSSIBLE TO THAT OF PETROLEUM OIL DESCRIBED ABOVE. THE FLUID MUST BE COMPATIBLE WITH SEALS OF FLUOROCARBON ELASTOMERS (I.E. VITON, ETC.). TO OBTAIN MOTORS EQUIPPED FOR OPERATION WITH SYNTHETIC FIRE RESISTANT FLUIDS, ADD THE PREFIX "F3" TO THE MODEL NUMBER.

- 42 FLUID TEMPERATURE..... 120° F. TYP. TO 180° F. MAX.
- 43 FLUID FILTRATION..... 35 MICRONS ABSOLUTE OR FINER
- 44 CIRCUIT DESIGN SHOULD PROTECT MOTOR FROM PRESSURE SURGES AND/OR CAVITATION.

45 CASE OUTLET FLOW LINE MUST BE UNRESTRICTED AND SIZED SUCH THAT CASE PRESSURE AT MOTOR NEVER EXCEEDS RATINGS. EITHER CASE OUTLET MAY BE USED. LEAVE OTHER PLUGGED.

46 INTERMITTENT (15 MINUTES OR LESS) UNLOADED RUNNING IS PERMITTED AFTER PROPER START AND WARM UP, TO 200 RPM.

47 CASE OUTLET FLOW MUST BE UNRESTRICTED AND MUST BE CHECKED FOR MINIMUM OF .05 GPM.

48 THERMAL SHOCKS IN EXCESS OF 50° F. ARE NOT RECOMMENDED. WHEN MOTOR IS COLD AND OIL IS HOT, START AND STOP MOTOR UNTIL TEMPERATURES ARE EQUALIZED. FOR MORE COMPLETE INFORMATION ON START-UP, PLEASE CONSULT YOUR LOCAL SPERRY VICKERS REPRESENTATIVE.

FOR MULTI-TORQUE AND MULTI-SPEED OPERATION IT IS PREFERRED THAT THE "B" SINGLE PORT BODY BE USED AS INLET. IF BI-DIRECTIONAL ROTATION IS REQUIRED, USE THE "B" PORT FOR PRIMARY DIRECTION OF ROTATION. WHEN "B" PORT IS INLET, THE IDLING "A" PORT MUST BE CONNECTED TO THE "B" PORT. SEE DIAGRAMS BELOW. A1 AND A2 PORT DISPLACEMENT IS 56.5 C.I.R. ON THE MHT-150/75/75. ON THE MHT-130/75/55 MOTOR THE A1 PORT DISPLACEMENT IS 56.5 C.I.R. AND THE A2 PORT IS 41.5 C.I.R. USE OF BOTH "A" PORTS GIVES MAXIMUM DISPLACEMENT OF EACH MODEL.

## **NOTE:**

IT IS GOOD PRACTICE TO LUBRICATE THE INTERNAL PARTS OF THESE NEW UNITS WITH HYDRAULIC FLUID BEFORE START-UP. ADD THE HYDRAULIC FLUID USED, TO THE INLET, OUTLET, OF THE MHT MOTORS PRIOR TO STARTING.

MODEL CODE	F3 - MHT - 130/75/55 - ** - 30	DESIGN NUMBER
SPECIAL SEALS	SEE FLUIDS AND SEALS NOTE.	SUBJECT TO CHANGE. INSTALLATION DIMENSIONS REMAIN AS SHOWN FOR DESIGN NUMBERS 30 THRU 39.
HIGH TORQUE		
LOW SPEED VANE MOTOR		
THEORETICAL OUTPUT		SHAFT TYPE
TORQUE LB. FT./100 Δ PSI		R1 = STANDARD-SOLID-SHAFT
130 - 130 STD. SERIES		N1 = NO SHAFT
150 - 150 STD. SERIES		
130 - 130/75/55 MULTI-TORQUE SERIES		
150 - 150/75/75 MULTI-TORQUE SERIES		

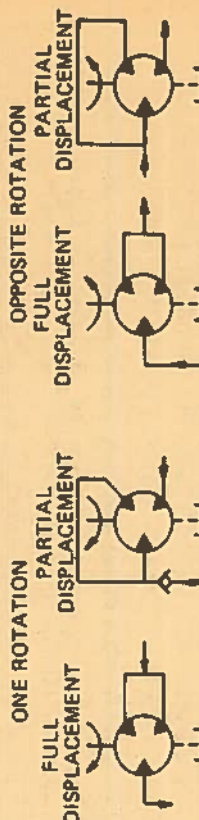
## **STANDARD GRAPHICAL SYMBOLS FOR FLUID POWER DIAGRAMS**



## **STANDARD MOTOR**

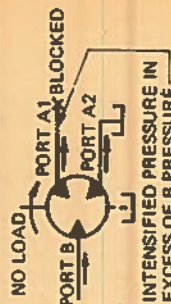
## **MULTI-TORQUE MOTORS**

MOTOR INSTALLATION POSSIBILITIES FOR FULL AND PARTIAL DISPLACEMENT AND BOTH DIRECTIONS OF ROTATION.



NOTE: USE OF CHECK VALVE DEPENDS ON CIRCUIT NEEDS.

CAUTION: AVOID CIRCUITS WHERE ANY CONDITIONS COULD CAUSE INTENSIFIED PRESSURE. MULTI-DISPLACEMENT MOTORS LIKE CYLINDERS, CAN EXPERIENCE INTENSIFIED PRESSURES UNDER SOME CIRCUIT CONDITIONS SUCH THAT PRESSURES WILL EXCEED THE MOTOR, PIPING OR VALVE RATING. EXAMPLE AT RIGHT:









# GENERAL DATA

THE MHT-250 SERIES MOTORS ARE HIGH-TORQUE LOW SPEED VANE MOTORS. THEY ARE CAPABLE OF SMOOTH SPEEDS THROUGHOUT THEIR ENTIRE PRESSURE AND SPEED RANGES. THEY WILL PERFORM EQUALLY WELL IN EITHER DIRECTION OF ROTATION.

THE MHT-250 PROVIDES A SINGLE DISPLACEMENT, ONE SPEED AND ONE TORQUE FOR A GIVEN FLOW AND PRESSURE.

THE MHT-250/125/125 IS A MULTI-TORQUE MOTOR. THE MULTI-DISPLACEMENT FEATURE PROVIDES FOR SELECTION OF TWO OR THREE SPEED OPERATIONS FOR A GIVEN FLOW, AND TWO OR THREE TORQUE CAPACITIES CORRESPONDING TO THE SPEEDS. SEE RATINGS BELOW AND ITEM 49.

## ROTATION

FLUID TO PORTS "A" GIVES CW ROTATION.  
FLUID TO PORT "B" GIVES CCW ROTATION.

## CONVERSION

A BASIC MHT-250-R1-30 BECOMES A MHT-250-N1-30 BY OMITTING TWO BEARINGS 310539, TWO SNAP RINGS 354386, AND SHAFT 345769.

## RATINGS

THEORETICAL DISPLACEMENT (IN. <sup>3</sup>/REV.)

MHT-190.....	143
MHT-220.....	166
MHT-250.....	188
MHT-250/125/125.....	94 & 188
MHT-220/125/95.....	72 & 94 & 166
MHT-190/95/95.....	72 & 144

THEORETICAL OUTPUT TORQUE/100 PSI DIFFERENTIAL (LB. FT.)

MHT-190.....	190
MHT-220.....	220
MHT-250.....	250
MHT-250/125/125.....	125 & 250
MHT-220/125/95.....	95 & 125 & 220
MHT-190/95/95.....	95 & 190

CASE PORT PRESSURE (PSI) MAX. .... 0-150  
SPEED RANGE (RPM) AT UP TO 2000 PSI DIFFERENTIAL. .... 0-25  
MAXIMUM ROTATING PRESSURE..... 2000 PSI  
MAXIMUM BREAKAWAY PRESSURE (PSI) (STALL - NO ROTATION). .... 2750  
MAXIMUM PRESSURE (PSI) TO INLET OR OUTLET PORT..... 2750  
MAXIMUM SUM OF PRESSURE (PSI) AT INLET AND OUTLET PORTS..... 2750  
PERFORMANCE DATA FOR SPECIFIC APPLICATIONS AVAILABLE ON REQUEST FROM YOUR SPERRY VICKERS APPLICATION ENGINEER.

## BEARING DATA

BEARING CAPACITY (RADIAL OR AXIAL)..... 12520 LBS. AFBMA @ 33-1/3 RPM.  
500 HOURS 8-10 LIFE, 6000 LBS. @ 50 RPM, 15000 HOURS AVERAGE LIFE (UNRELATED TO MOTOR LIFE).

APPROXIMATE INERTIA OF ROTATING GROUP

WITHOUT SHAFT.....	940 LB.-IN. <sup>2</sup>	2.43 LB.-IN.-SEC. <sup>2</sup>
WITH SHAFT.....	1100 LB.-IN. <sup>2</sup>	2.85 LB.-IN.-SEC. <sup>2</sup>

## BRAKING

THE SINGLE DISPLACEMENT OR MULTI-TORQUE MOTORS MAY BE USED AS A BRAKE AT FULL DISPLACEMENT ANY SPEED AND PRESSURE COMBINATION PERMISSIBLE BY MOTOR RATINGS. PARTIAL DISPLACEMENT BRAKING NOT APPROVED.

WEIGHT LBS. (APPROX.)

WITHOUT SHAFT.....	440
WITH SHAFT.....	520

## MOUNTING

1 MOTOR "HOUSING" WILL ACCEPT NO AXIAL LOADING EXCEPT AT 13.50 BOLT CIRCLE.

2 CUSTOMER MOUNTING SURFACE SHALL BE FLAT WITHIN .001 IN. AND PERPENDICULAR TO AXIS WITHIN .001 TIR.

3 THE SPLINED ROTOR WILL NOT ACCEPT ANY SHAFT-TRANSLATION, (SLIDING AXIALLY THRU SPLINE) WHEN MOTOR IS LOADED (PRODUCING TORQUE).

4

IF THE SHAFT MUST ABSORB AXIAL FORCES, PRELOADING WILL BE REQUIRED TO PREVENT ANY TRANSLATION. (CONSULT SPERRY VICKERS APPLICATION ENGINEER.)

5

IF THE APPLICATION REQUIRES THE MOUNTING FACE TO BE SEALED, AN AREA HAS BEEN PROVIDED FOR USE WITH A 11.00 ID "O" RING SUCH AS SPERRY VICKERS P/N 198838.

6

MOTORS MAY BE SUPPLIED WITH THREADS DRILLED OUT OF MOUNTING SURFACE BODY FOR THROUGH MOUNTING WITH STANDARD STUDS OR SCREWS. IF REQUIRED, THRU SCREWS MUST BE TIGHTENED TO 150 ±15 LB. FT. OILED THRU STUDS OR SCREWS NOT FURNISHED. S13 - THREADS DRILLED FROM SHAFT END BODY, S18 - FROM HEAD END BODY.

7

CONVENTIONAL MOUNTING IS WITH SIX SCREWS THRU BACK OF MOUNTING PLATE. 750-10UNC-2B MOUNTING HOLES 6 PLACES EQUALLY SPACED AS SHOWN. MTG. SCREW PENETRATION: 1.50 MAX. TORQUE TO 70-80 LB.-FT. OILED.

8

MOTOR MOUNTING ORIENTATION IS UNRESTRICTED AS TO PORT LOCATION AND MOUNTING FACE. THE SHAFT MAY PROTRUDE FROM EITHER BODY.

9

PILOT MUST BE A NON-BINDING SLIP FIT, AND SHALL NOT EXCEED .230 MAXIMUM INTO MOTOR.

10

THESE 30 DESIGN MOTORS CAN BE MADE INTERCHANGEABLE WITH PRECEDING DESIGNS. SEE DESIGN ASSISTANCE SKETCH 23267-K.

11

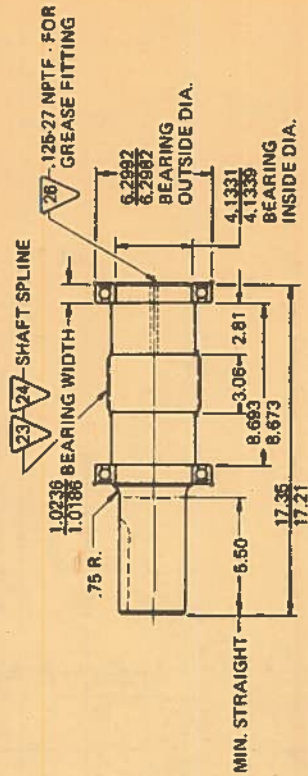
DOWEL HOLES .750 DIA. - 1.00 DEEP MAY BE ADDED BY CUSTOMER AT ANY TWO (180° APART) OF THESE SIX MOUNTING HOLES IF REQUIRED ON EITHER BODY.

12

PILOT MUST BE A NON-BINDING SLIP FIT AND SHALL NOT EXCEED .130 MAXIMUM INTO MOTOR.

## SHAFT DATA

22 SHAFT DESIGN MUST PROVIDE SPLINE GREASE RETENTION. SPLINE IS NOT LUBRICATED BY SYSTEM FLUID. CUSTOMER SHAFT NEEDS NO SHAFT SEAL SURFACE FOR SYSTEM FLUID RETENTION.



SHAFT SPLINE DATA -

EXTERNAL INVOLUTE SPLINE

FILLET ROOT - SIDE FIT

PITCH DIA. - 4.8000 REF.

BASE DIA. - 4.1569 REF.

NO. OF TEETH - 48

DIAMETRAL PITCH - 10/20

PRESSURE ANGLE - 30°

FORM DIA. - 4.6804

MAJOR DIA. - 4.9000/4.8950

MINOR DIA. - 4.6200/4.6050

FILLET RADII - .040 REF.

CIRCULAR TOOTH THICKNESS -

.1517 MAX. ACT. REF.

.1501 MIN. ACT.

.1538 MAX. EFF.

1522 MIN. EFF. REF.

MEASUREMENT OVER .1920 PINS:

5.0916 MAX. REF.

5.0890 MIN. REF.

23 SHAFT SPLINE MUST SLIP FIT INTO ROTOR.



**24** WHEN DISASSEMBLING OR INSTALLING A SHAFT, THERE SHALL BE NO BINDING AND NO AXIAL FORCE APPLIED.

**25** WITH A SHAFTLESS ASSEMBLY, THE CUSTOMER SHAFT SHALL PROVIDE ITS OWN BEARINGS, AND CENTER THE ROTOR WITH .004 TIR CONCENTRICITY TO THE PILOT DIAMETERS.

**26** THE SHAFT SPLINE SHOULD BE PACKED WITH FIBROUS WHEEL-BEARING GREASE AT SIX MONTH INTERVALS, OR SOONER IF OPERATION IS AT HIGH TEMPERATURE. A STANDARD 1/8 NPT GREASE FITTING MAY BE INSTALLED AT THE END OF THE SHAFT FOR THIS PURPOSE.

**27** A COVER MAY BE MADE TO SEAL OFF SHAFTLESS MODELS AT THIS LOCATION. SEE DESIGN ASSISTANCE SKETCH 23263-K. THE COVER HAS PROVISION FOR A 1/8 NPT GREASE FITTING. USE WITH "O" RING P/N 154057 AND SNAP RING 354386 OR EQUIVALENT. (COVER 23263-K NOT MANUFACTURED BY SPERRY VICKERS - FOR CUSTOMER INFORMATION ONLY.)

**28** IF CUSTOMER INSTALLATION USES NO BEARINGS IN THE MOTOR, SPLINE GREASE RETENTION MAY BE OBTAINED BY USING A SHAFT SEAL ADAPTER MOUNTED IN THE BEARING BORE WITH "O" RING 154057 AND SNAP RING 354386 OR EQUIVALENT. SEE DESIGN ASSISTANCE SKETCH 23262-K FOR ADAPTER. SUGGESTED SHAFT SEAL SIZE IS 4.125 ID. (ADAPTER NOT MANUFACTURED BY SPERRY VICKERS - FOR CUSTOMER INFORMATION ONLY.)

## CIRCUIT

**41** **FLUIDS**  
PETROLEUM OILS AND FLUID TEMPERATURE - USE ANTIWEAR TYPE HYDRAULIC OILS OR SAE 10W OR 20-20W OILS HAVING LETTER DESIGNATIONS "SC, SD, OR SE" PER SAE TECHNICAL REPORT J1839. (SEE "OIL RECOMMENDATION SHEET 286-S" FOR DETAILS.) MOTOR OPERATING FLUID VISCOSITY IS 70 TO 250 SUS. OIL TEMPERATURE OF 120°F. TO 180°F. MAXIMUM IS TYPICAL. LOWER VISCOSITIES (100 SSU) TEND TO REDUCE SOUND.

**WATER CONTAINING FLUIDS** - WATER GLYCOLS (NOT WATER-IN-OIL EMULSIONS) AS PRODUCED BY RESPONSIBLE SOURCES FOR RATINGS GIVEN HEREIN, ARE RECOMMENDED. SELECT FLUIDS WITH A VISCOSITY AS CLOSE AS POSSIBLE TO THAT OF PETROLEUM OIL DESCRIBED ABOVE. IT IS RECOMMENDED THAT TEMPERATURES FOR WATER BASE FLUIDS BE LIMITED TO A MAXIMUM OF 130°F.

**SYNTHETIC FIRE RESISTANT FLUIDS** - PHOSPHATE ESTERS AND ITS BLENDS AS PRODUCED BY RESPONSIBLE SOURCES FOR RATINGS GIVEN HEREIN ARE RECOMMENDED. SELECT FLUIDS WITH VISCOSITY AS CLOSE AS POSSIBLE TO THAT FOR PETROLEUM OIL DESCRIBED ABOVE. THE FLUID MUST BE COMPATIBLE WITH SEALS OF FLUOROCARBON ELASTOMERS. (i.e., VITON, ETC.). TO OBTAIN MOTORS EQUIPPED FOR OPERATION WITH SYNTHETIC FIRE RESISTANT FLUIDS, ADD THE PREFIX "F3" TO THE MODEL NUMBER.

**42** **FLUID FILTRATION**..... 35 MICRONS ABSOLUTE OR FINER

**43** **CIRCUIT DESIGN** SHOULD PROTECT MOTOR FROM PRESSURE SURGES AND/OR CAVITATION.

**44** CASE OUTLET FLOW LINE MUST BE UNRESTRICTED AND SIZED SUCH THAT CASE PRESSURE AT MOTOR NEVER EXCEEDS 25 PSI MAX. EITHER OR BOTH CASE OUTLETS MAY BE USED.

**45** **INTERMITTENT** (15 MINUTES OR LESS) UNLOADED RUNNING IS PERMITTED AFTER PROPER START AND WARM UP, TO 50 RPM.

**46** CASE OUTLET FLOW MUST BE CHECKED FOR MINIMUM OF .05 GPM UNDER ANY CONDITION. IF NECESSARY, CASE FLOW MAY BE INCREASED BY BACK-PRESSURE AT THE MOTOR OUTLET PORT, OR USE OF LOWER VISCOSITY FLUID OR HIGHER FLUID TEMPERATURE.

**47** **THERMAL SHOCKS** IN EXCESS OF 50 FAHRENHEIT DEGREES ARE NOT RECOMMENDED. WHEN MOTOR IS COLD AND OIL IS HOT, START AND STOP MOTOR UNTIL TEMPERATURES ARE EQUALIZED. CASE FLOW MUST BE PRESENT.

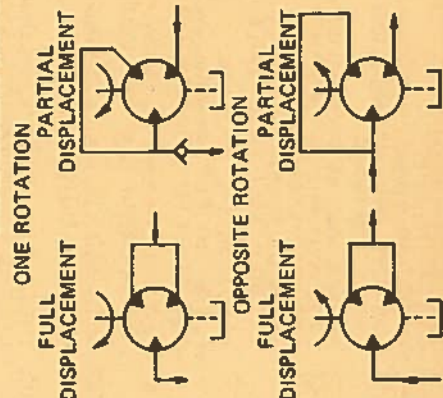
**48** FOR MULTI-TORQUE AND MULTI-SPEED OPERATION IT IS PREFERRED THAT THE "B" SINGLE PORT BODY BE USED AS INLET. IF BI-DIRECTIONAL ROTATION IS REQUIRED, USE THE "B" PORT FOR PRIMARY DIRECTION OF ROTATION. WHEN "B" PORT IS INLET THE IDLING "A1" AND "A2" PORT DISPLACEMENT IS "B" PORT. SEE DIAGRAMS BELOW. "A1" AND "A2" PORT DISPLACEMENT IS 72 C.I.R. ON THE MHT-190/95/96 AND 94 C.I.R. ON MHT-250/125/125. ON A MHT-220/125/95 MOTOR THE "A1" PORT DISPLACEMENT IS 94 C.I.R. AND THE "A2" PORT IS 72 C.I.R. USE OF BOTH "A" PORTS GIVES MAXIMUM DISPLACEMENT OF EACH MODEL.

**NOTE:**  
IT IS GOOD PRACTICE TO LUBRICATE THE INTERNAL PARTS OF THESE NEW UNITS WITH HYDRAULIC FLUID BEFORE START-UP. ADD THE HYDRAULIC FLUID USED, TO THE INLET OR OUTLET OF THE MHT MOTORS PRIOR TO STARTING. FOR MORE COMPLETE INFORMATION ON START-UP, PLEASE CONTACT YOUR LOCAL SPERRY VICKERS REPRESENTATIVE.

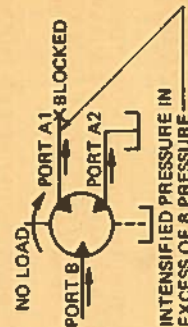
MODEL CODE	F3 - MHT 250 - ** - 30	DESIGN NUMBER
SPECIAL SEALS SEE FLUIDS AND SEALS NOTE.		SUBJECT TO CHANGE. INSTALLATION DIMENSIONS REMAIN AS SHOWN FOR DESIGN NUMBERS 20 THRU 29.
HIGH TORQUE LOW SPEED VANE MOTOR		SHAFT TYPE R1 = STANDARD SOLID SHAFT N1 = NO SHAFT
THEORETICAL OUTPUT TORQUE LB. FT./100 Δ PSI (SEE PAGE 1 FOR STANDARD AND MULTI-TORQUE MODELS)		

## STANDARD GRAPHICAL SYMBOLS

MOTOR INSTALLATION POSSIBILITIES FOR FULL AND PARTIAL DISPLACEMENT AND BOTH DIRECTIONS OF ROTATION.



**CAUTION:** AVOID CIRCUITS WHERE ANY CONDITIONS COULD CAUSE INTENSIFIED PRESSURE. MULTI-DISPLACEMENT MOTORS LIKE CYLINDERS, CAN EXPERIENCE INTENSIFIED PRESSURES UNDER SOME CIRCUIT CONDITIONS SUCH THAT PRESSURES WILL EXCEED THE MOTOR, PIPING OR VALVE RATING. EXAMPLE:



**NOTE:** USE OF CHECK VALVE DEPENDS ON CIRCUIT NEEDS.



**SPERRY-VICKERS HYDRAULIC VANE MOTORS**

**MODEL SERIES MHT-500, 440, 380 .\*\*30  
HIGH TORQUE - LOW SPEED  
FIXED DISPLACEMENT**

THE NUMBERED TRIANGLES POINT OUT AREAS OF THE MOTORS WHERE SPECIFIC INFORMATION IS KEYED ON PAGES 520260B.1 AND -2.

—:750-10 UNC-2B  
MOUNTING HOLES  
6 PLACES EQUALLY  
SPACED AS SHOWN

50-10 UNC-2A ASSEMBLY SCREWS  
50 LONG - 6 PLACES EQUALLY  
SPACED AS SHOWN FROM EACH SIDE  
15° REF. 15° REF.

1.46 BOTH BODIES—

COVER INFORMATION=

3 12

75-  
TYP.

## HYDRAULIC VANE MOTORS MULTI-TORQUE

**MODEL SERIES MHT-500/250/250, 440/250/190, 380/190/190-\*.30  
HIGH TORQUE · LOW SPEED MULTI FIXED DISPLACEMENT**

**DETAIL "A" ALL MODELS**

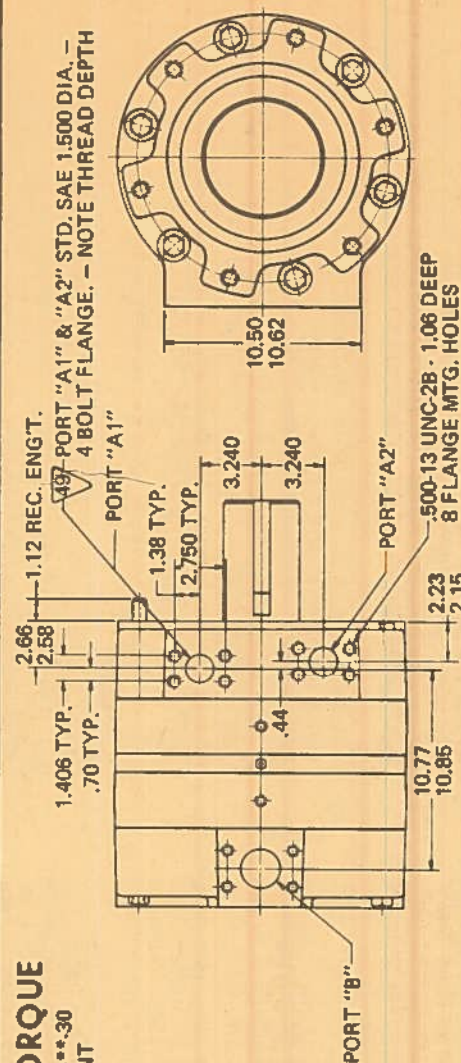
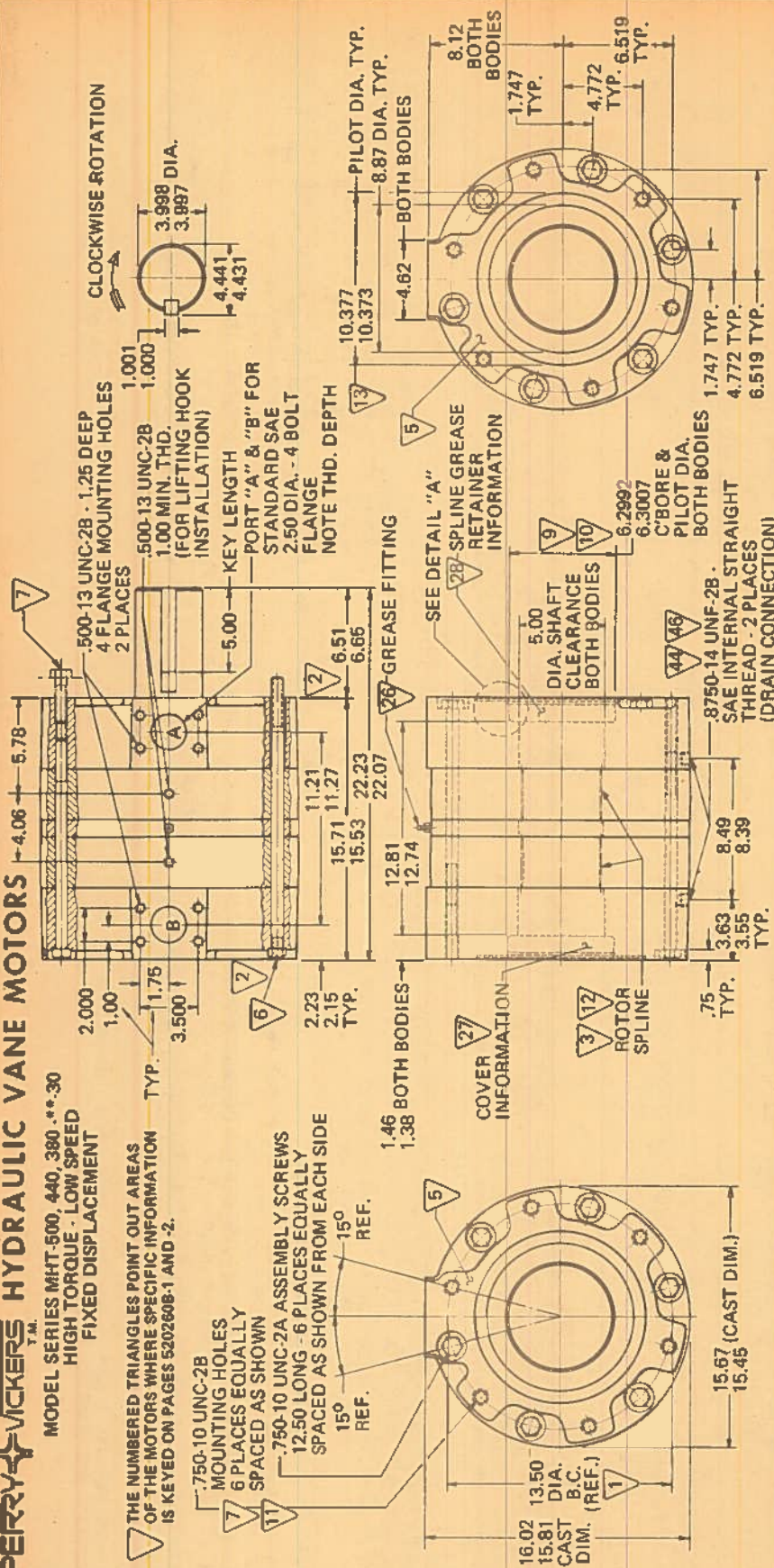
SEE NOTE 4  
BODY U' CUT  
U31 DEEP

NOTE: FACE PILOT  
1.15 DEEP EXCEPT  
2 PORT BODY  
30 DEEP

REVISÉ 12-1-78

**NOTE: ALL OTHER DIMENSIONS & VIEWS SAME AS ABOVE**

5202808





THE MHT 500 SERIES MOTORS ARE HIGH-TORQUE LOW-SPEED VANE MOTORS. THEY ARE CAPABLE OF SMOOTH SPEEDS THROUGHOUT THEIR ENTIRE PRESSURE AND SPEED RANGES. THEY WILL PERFORM EQUALLY WELL IN EITHER DIRECTION OF ROTATION.

THE MHT-500/250/250, MHT-440/250/190 AND MHT-380/190/190 ARE MULTI-TORQUE MOTORS. THE MULTI-DISPLACEMENT FEATURE PROVIDES FOR SELECTION OF TWO OR THREE SPEED OPERATIONS FOR A GIVEN FLOW, AND TWO OR THREE TORQUE CAPACITIES CORRESPONDING TO THE SPEEDS. SEE RATINGS BELOW AND ITEM 49.

**FLUID TO PORTS "A" GIVES CW ROTATION.**

## RATINGS

NOMINAL SIZE	500	440	380	250	190
THEORETICAL DISPLACEMENT (IN. <sup>3</sup> /REV.)	376	332	288	188	144
THEORETICAL OUTPUT TORQUE PER 100 PSI DIFFERENTIAL (LB. FT.)	500	440	380	250	190

CASE PORT PRESSURE (PSI) MAX.	0-25
MAXIMUM ROTATING PRESSURE	2000 PSI
MAXIMUM SPEED AT 2000 PSI DIFFERENTIAL	150 RPM
MAXIMUM BREAKAWAY PRESSURE (STALL-NO ROTATION)	2750 PSI
MAXIMUM PRESSURE TO INLET OR OUTLET PORT	2750 PSI
MAXIMUM SUM OF PRESSURE AT INLET & OUTLET PORTS	2750 PSI

PERFORMANCE DATA FOR SPECIFIC APPLICATIONS AVAILABLE ON REQUEST FROM YOUR SPERRY VICKERS APPLICATION ENGINEER.

APPROXIMATE INERTIA OF MHT ROTATING GROUP	4 86 LB. IN. SEC. <sup>2</sup>
WITHOUT SHAFT	1880 LB. IN. <sup>2</sup>

WITH SHAFT.....	2117 LB-IN. <sup>2</sup>	5.47 LB-IN./SEC. <sup>2</sup>
<b>BEARING DATA</b>		

BEARING CAPACITY (RADIAL OR AXIAL)..... 12520 LBS. AFBMA @ 33-1/3 RPM;  
500 HOURS B TO LIFE, 6000 LBS. @ 50 RPM. 15000 HOURS AVERAGE LIFE (UNRELATED  
TO MOTOR LIFE)

UNITS AT FULL DISPLACEMENT MAY BE USED AS A BRAKE WITHIN MOTOR RATINGS.  
INLET SUPERCHARGE SHOULD BE AT LEAST 100 PSI, ESPECIALLY ABOVE 100 RPM,  
TO PREVENT CAVITATION. PARTIAL DISPLACEMENT BRAKING IS NOT APPROVED.  
WEIGHT LBS. (APPROX.) SHAFTLESS. . . . . 630  
WITH SHAFT . . . . . 730

1 MOTOR HOUSING WILL ACCEPT NO AXIAL LOADING EXCEPT AT 13.50 DIA. BOLT CIRCLE.

3 THE SPLINED ROTOR WILL NOT ACCEPT ANY SHAFT-TRANSLATION, (SLIDING AXIALLY THRU SPLINE) WHEN MOTOR IS LOADED (PRODUCING TORQUE).

4 IF THE SHAFT MUST ABSORB AXIAL FORCES, PRELOADING MAY BE REQUIRED TO PREVENT ANY TRANSLATION. (CONSULT SPERRY VICKERS APPLICATION ENGINEER.)

5 IF THE APPLICATION REQUIRES THE MOUNTING FACE TO BE SEALED, AN AREA HAS BEEN PROVIDED FOR USE WITH A 11.00 ID "O" RING SUCH AS SPERRY VICKERS P/N 199838 OR EQUIVALENT.

6 MOTORS MAY BE SUPPLIED WITH THREADS DRILLED OUT OF MOUNTING SURFACE BODY FOR THRU MOUNTING WITH STANDARD STUDS OR SCREWS. IF REQUIRED, THRU SCREWS MUST BE TORQUED TO 150 ±15 LBFF OILED. THRU

CONVENTIONAL MOUNTING IS WITH SIX SCREWS THRU BACK OF MOUNTING

**MOTOR MOUNTING ORIENTATION IS UNRESTRICTED AS TO PORT LOCATION**

PILOT MUST BE A NON-BINDING SLIP FIT, AND SHALL NOT EXCEED .230 MAX.

THESE 30 DESIGN MOTORS CAN BE MADE INTERCHANGEABLE WITH PRECEDING INTO MOTOR.

DESIGNS. SEE DESIGN ASSISTANCE SKETCH 23267-K.

DOWNELL HOLES (750 DIA. 100 DEPT.) MAY BE ADDED ON CUSTOMER'S REQUEST. (180° APART) OF THESE SIX MOUNTING HOLES IF REQUIRED, ON EITHER BODY.

ROTOR SPLINES MUST BE KEPT IN FACTORY ALIGNMENT. DO NOT ROTATE ONE WITH RESPECT TO THE OTHER.

PILOT MUST BE A NON-BINDING SLIP FIT AND SHALL NOT EXCEED .130 MAXIMUM

**CUSTOMER SHAFT DESIGN MUST PROVIDE SPLINE GREASE RETENTION. SPLINE IS NOT LUBRICATED BY SYSTEM FLUID. CUSTOMER SHAFT NEEDS NO SHAFT SEAL SURFACE FOR SYSTEM FLUID RETENTION**

SHAFT SPLINE MUST SLIP FIT INTO ROTORS.

## SHAFT SPLINE DATA --

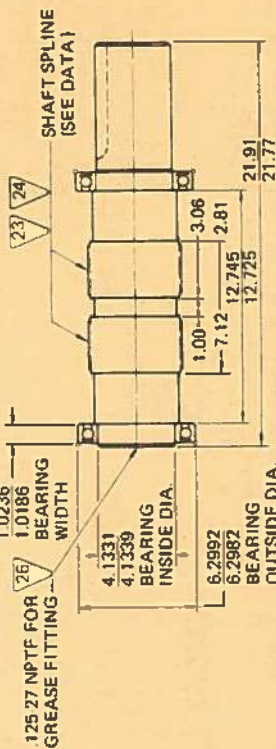
EXTERNAL INVOLUTE SPLINE  
FILLET ROOT SIDE FIT  
FILLET RADIUS .040 REF.  
CIRCULAR TOOTH THICKNESS -

PITCH DIA.	4.8000 REF.	1517 MAX. ACT. REF.
BASE DIA.	4.1569 REF.	1501 MIN. ACT.
		1528 MAX. ACT.

NO OF TEETH 48  
DIAMETRAL PITCH 10/20  
PRESSURE ANGLE 20°  
MEASUREMENT OVER 1920 PINS.  
1522 MIN. EFF. REF.  
1538 MAX. EFF.

FORM DIA. - 4.6904  
MAJOR DIA. - 4.9000/4.8950  
PRESSURE ANGLE - 30  
5.0916 MAX. REF.  
5.0890 MIN. REF.

MINOR DIA. - 4.6200/4.6050  
+ .0002



WHEN DISASSEMBLING OR INSTALLING A SHAFT, THERE SHALL BE NO BINDING AND NO AXIAL FORCE APPLIED TO THE ROTOR.

AND NO AXIAL FORCE APPLIED TO THE ROTOR. WITH A SHAFTLESS ASSEMBLY, THE CUSTOMER SHAFT SHALL PROVIDE ITS OWN BEARINGS, AND CENTER THE ROTOR WITH .004 TIR CONCENTRICITY TO THE PILOT DIAMETERS.



THE SHAFT SPLINE SHOULD BE PACKED WITH FIBROUS WHEEL-BEARING GREASE AT SIX MONTH INTERVALS, OR SOONER IF OPERATION IS AT HIGH TEMPERATURE. A STANDARD 1/8 NPTF GREASE FITTING IS INSTALLED IN THE TOP CENTER SECTION FOR THIS PURPOSE. ALSO A STANDARD 1/8 NPT GREASE FITTING MAY BE INSTALLED AT THE END OF THE SHAFT, FOR THE SAME PURPOSE.

A COVER MAY BE MADE TO SEAL OFF SHAFTLESS MODELS AT THIS LOCATION. SEE DESIGN ASSISTANCE SKETCH NO. 23263-K. THIS COVER HAS PROVISION FOR A 1/8 NPTF GREASE FITTING. USE WITH "O" RING P/N 154057 AND SNAP RING 354386 OR EQUIVALENT. (COVER 23263-K NOT MANUFACTURED BY SPERRY VICKERS - FOR CUSTOMER INFORMATION ONLY.)

IF CUSTOMER INSTALLATION USES NO BEARINGS IN THE MOTOR, SPLINE GREASE RETENTION MAY BE OBTAINED BY USING A SHAFT SEAL ADAPTER MOUNTED IN THE BEARING BORE WITH "O" RING 154057 AND SNAP RING 354386 OR EQUIVALENT. SEE DESIGN ASSISTANCE SKETCH 23262-K FOR ADAPTER. SUGGESTED SHAFT SEAL SIZE 4.125 ID (ADAPTER 23262-K NOT MANUFACTURED BY SPERRY VICKERS - FOR CUSTOMER INFORMATION ONLY.)

#### CIRCUIT

41

#### FLUIDS

PETROLEUM OILS - SELECT ANTIWEAR TYPE INDUSTRIAL HYDRAULIC OILS OR AUTOMOTIVE CRANKCASE OILS WITH A NOMINAL VISCOSITY OF 150 TO 315 SUS AT 100° F. AND HAVING LETTER DESIGNATION "SC, SD, OR SE" PER SAE TECHNICAL REPORT J183a. OPERATING VISCOSITY RANGE IS 70 TO 250 SUS. OPERATING TEMPERATURE OF 120° F. TYPICAL TO 180° F. MAXIMUM IS RECOMMENDED. REFER TO DATA SHEET 1-286-S (SECTION L) FOR HYDRAULIC OIL RECOMMENDATIONS.

WATER-CONTAINING FLUIDS - WATER GLYCOLS (NOT WATER-IN-OIL EMULSIONS) AS PRODUCED BY RESPONSIBLE SOURCES FOR RATINGS GIVEN HEREIN, ARE RECOMMENDED. SELECT FLUIDS WITH A VISCOSITY AS CLOSE AS POSSIBLE TO THAT OF PETROLEUM OIL DESCRIBED ABOVE. IT IS RECOMMENDED THAT TEMPERATURES FOR WATER BASE FLUIDS BE LIMITED TO A MAXIMUM OF 130° F.

SYNTHETIC FIRE RESISTANT FLUIDS - PHOSPHATE ESTERS AND BLENDS AS PRODUCED BY RESPONSIBLE SOURCES FOR RATINGS GIVEN HEREIN ARE RECOMMENDED. SELECT FLUIDS WITH VISCOSITY AS CLOSE AS POSSIBLE TO THAT FOR PETROLEUM OIL DESCRIBED ABOVE. THE FLUID MUST BE COMPATIBLE WITH SEALS OF FLUOROCARBON AND SILICONE ELASTOMERS. (I.E. VITON, ETC.). TO OBTAIN MOTORS EQUIPPED FOR OPERATION WITH SYNTHETIC FIRE RESISTANT FLUIDS, ADD THE PREFIX "F3" TO THE MODEL NUMBER.

42 FLUID FILTRATION: ..... 35 MICRONS ABSOLUTE OR FINER

43 CIRCUIT DESIGN SHOULD PROTECT MOTOR FROM PRESSURE SURGES AND/OR CAVITATION.

44 CASE OUTLET FLOW LINE MUST BE UNRESTRICTED AND SIZED SUCH THAT CASE PRESSURE AT MOTOR NEVER EXCEEDS 25 PSI MAX. EITHER OR BOTH CASE OUTLETS MAY BE USED. LEAVE OTHER PLUGGED.

45 INTERMITTENT (15 MINUTES OR LESS) UNLOADED RUNNING IS PERMITTED AFTER PROPER START AND WARM UP, TO 50 RPM.

46 CASE OUTLET FLOW MUST BE UNRESTRICTED AND MUST BE CHECKED FOR MINIMUM OF 10 GPM. IF NECESSARY, CASE FLOW MAY BE INCREASED BY BACK-PRESSURE AT THE MOTOR OUTLET PORT, OR USE LOWER VISCOSITY FLUID OR HIGHER FLUID TEMPERATURE.

47 THERMAL SHOCKS IN EXCESS OF 50° F. ARE NOT RECOMMENDED. WHEN MOTOR IS COLD AND OIL IS HOT, START AND STOP MOTOR UNTIL TEMPERATURES ARE EQUALIZED. CASE FLOW MUST BE PRESENT.

48

NOTE: IT IS GOOD PRACTICE TO LUBRICATE THE INTERNAL PARTS OF THESE NEW UNITS WITH HYDRAULIC FLUID BEFORE START-UP. ADD THE HYDRAULIC FLUID USED TO THE INLET OUTLET OF THE MHT MOTORS PRIOR TO STARTING. FOR MORE COMPLETE INFORMATION ON START-UP, PLEASE CONTACT YOUR LOCAL SPERRY VICKERS REPRESENTATIVE.

FOR MULTI-TORQUE AND MULTI-SPEED OPERATION IT IS PREFERRED THAT THE "B" SINGLE PORT BODY BE USED AS INLET. IF BI-DIRECTIONAL ROTATION IS REQUIRED, USE THE "B" PORT FOR PRIMARY DIRECTION OF ROTATION. WHEN "B" PORT IS INLET THE IDLING "A" PORT MUST BE CONNECTED TO THE "B" PORT. SEE DIAGRAMS BELOW. ON THE MHT 440/250/190 MODEL FLUID THRU PORT "A1" GIVES 188 IN. 3/REV. DISPLACEMENT WHILE FLUID THRU PORT "A2" GIVES 144 IN. 3/REV. DISPLACEMENT. SEE SCHEMATIC BELOW.

#### MODEL CODE

HIGH TORQUE LOW SPEED VANE MOTOR	MHT	500/250/250	**	30	DESIGN NUMBER SUBJECT TO CHANGE IN- STALLATION DIMENSIONS REMAIN AS SHOWN FOR DESIGN NUMBERS 30 THRU 39.
THEORETICAL OUTPUT TORQUE LB. FT./100 ΔPSI					SHAFT TYPE R1 = STANDARD SOLID SHAFT N1 = NO SHAFT
500 STD. SERIES					
440 STD. SERIES					
380 STD. SERIES					
500/250/250 MULTI-TORQUE SERIES					
440/250/190 MULTI-TORQUE SERIES					
380/190/190 MULTI-TORQUE SERIES					

#### STANDARD GRAPHICAL SYMBOLS FOR FLUID POWER DIAGRAMS

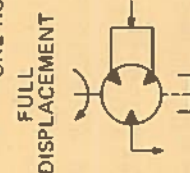


STANDARD MOTOR

#### MULTI-TORQUE MOTORS

MOTOR INSTALLATION POSSIBILITIES FOR FULL AND PARTIAL DISPLACEMENT AND BOTH DIRECTIONS OF ROTATION.

ONE ROTATION

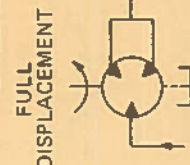


FULL DISPLACEMENT

FULL DISPLACEMENT

PARTIAL DISPLACEMENT

OPPOSITE ROTATION



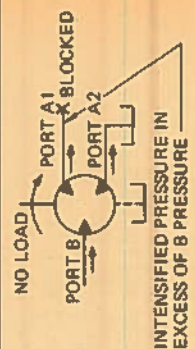
FULL DISPLACEMENT

FULL DISPLACEMENT

PARTIAL DISPLACEMENT

NOTE: USE OF CHECK VALVE DEPENDS ON CIRCUIT NEEDS.

CAUTION: AVOID CIRCUITS WHERE ANY CONDITIONS COULD CAUSE INTENSIFIED PRESSURE. MULTI-DISPLACEMENT MOTORS LIKE CYLINDERS, CAN EXPERIENCE INTENSIFIED PRESSURES UNDER SOME CIRCUIT CONDITIONS SUCH THAT PRESSURES WILL EXCEED THE MOTOR, PIPING OR VALVE RATING. EXAMPLE AT RIGHT:



5202608-2



**SPERRY-VICKERS**  
TROY, MICHIGAN 48064

**VANE MOTORS  
HIGH TORQUE  
LOW SPEED**

**THEORETICAL TORQUE  
STD. 750 LB. FT.  
MULTI 375 & 750 LB. FT.**

**THEORETICAL DISPLACEMENT  
STD. 565 CU. IN./REV.  
MULTI 283 & 565 CU. IN./REV.**

**SPEED  
RANGE  
0-100**

**DWG. NO.  
520270**

# **SPERRY-VICKERS HYDRAULIC VANE MOTORS**

MODEL SERIES MHT-750/375-30  
HIGH TORQUE - LOW SPEED  
FIXED DISPLACEMENT

THE NUMBERED TRIANGLES POINT OUT AREAS  
OF THE MOTORS WHERE SPECIFIC INFORMATION  
IS KEYED ON PAGES 520270-1 AND -2.

750-10 UNC-2B MOUNTING HOLES  
6 PLACES EQUALLY SPACED AS SHOWN  
MOUNTING SCREW PENETRATION  
1.50 MAX. TORQUE TO 70-80 LB.-FT. OILED  
750-10 UNC-2A STUDS 16.85 LONG  
6 PLACES EQUALLY SPACED  
AS SHOWN FROM EACH SIDE

15° REF.

SPLINE GREASE  
RETAINER  
INFORMATION

COVER  
INFORMATION

ROTOR  
SPLINE

.75 TYP.

15.67  
15.45  
(CAST DIM.)

500-13 UNC-2B 1.00 MIN. THD.  
(FOR LIFTING HOOK  
INSTALLATION - 3 PLACES)

500-13 UNC-2B-  
1.25 DEEP - 4 FLANGE  
MOUNTING HOLES  
2 PLACES

PORT "A" & "B"  
FOR STANDARD  
SAE 2.50 DIA.  
KEY LGTH 4 BOLT FLANGE  
NOTE THD. DEPTH

2.00  
REC.  
ENG. T.

6.51  
6.65

GREASE FITTING

1.46 BOTH BODIES  
1.38 BOTH BODIES

SEE DETAIL "A"

5.00 DIA. SHAFT  
CLEARANCE  
BOTH BODIES

6.2992  
6.3007

C'BORE &  
PILOT DIA.  
BOTH BODIES

1.747 TYP.  
4.772 TYP.  
6.519 TYP.

10.377 DIA.  
10.373 DIA.

8.87 DIA.  
4.62 TYP.

8.12 BOTH BODIES

1.747 TYP.  
4.772 TYP.  
6.519 TYP.

10.377 DIA.  
10.373 DIA.

8.87 DIA.  
4.62 TYP.

8.12 BOTH BODIES

1.747 TYP.  
4.772 TYP.  
6.519 TYP.

10.377 DIA.  
10.373 DIA.

8.87 DIA.  
4.62 TYP.

8.12 BOTH BODIES

1.747 TYP.  
4.772 TYP.  
6.519 TYP.

10.377 DIA.  
10.373 DIA.

8.87 DIA.  
4.62 TYP.

8.12 BOTH BODIES

1.747 TYP.  
4.772 TYP.  
6.519 TYP.

10.377 DIA.  
10.373 DIA.

8.87 DIA.  
4.62 TYP.

8.12 BOTH BODIES

1.747 TYP.  
4.772 TYP.  
6.519 TYP.

10.377 DIA.  
10.373 DIA.

8.87 DIA.  
4.62 TYP.

8.12 BOTH BODIES

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4.772 TYP.  
6.519 TYP.

10.377 DIA.  
10.373 DIA.

8.87 DIA.  
4.62 TYP.

8.12

5.78

2.000

1.000

1.75

3.500

2.23

2.15

15.35

15.25

19.78

26.30

19.58

26.12

16.88

16.79

12.58

12.42

3.63

3.55

8750-14 UNF-2B SAE  
INTERNAL STRAIGHT  
THREAD - 2 PLACES (DRAIN CONNECTION)

5.00 DIA. SHAFT  
CLEARANCE  
BOTH BODIES

6.2992  
6.3007

C'BORE &  
PILOT DIA.  
BOTH BODIES

1.747 TYP.  
4.772 TYP.  
6.519 TYP.

10.377 DIA.  
10.373 DIA.

8.87 DIA.  
4.62 TYP.

8.12 BOTH BODIES

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INTERNAL STRAIGHT  
THREAD - 2 PLACES (DRAIN CONNECTION)

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CLEARANCE  
BOTH BODIES

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PILOT DIA.  
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8.12 BOTH BODIES

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4.772 TYP.  
6.519 TYP.

8.12

5.78

2.000

1.000

1.75

3.500

2.23

2.15

15.35

15.25

19.78

26.30



## i - 42





THE SHAFT SPLINE SHOULD BE PACKED WITH FIBROUS WHEEL-BEARING GREASE AT SIX MONTH INTERVALS, OR SOONER IF OPERATION IS AT HIGH TEMPERATURE. STANDARD 1/8 NPTF GREASE FITTINGS ARE INSTALLED IN THE TOP SPACER SECTIONS FOR THIS PURPOSE. ALSO A STANDARD 1/8 NPT GREASE FITTING MAY BE INSTALLED AT THE END OF THE SHAFT, FOR THE SAME PURPOSE.



A COVER MAY BE MADE TO SEAL OFF SHAFTLESS MODELS AT THIS LOCATION. SEE DESIGN ASSISTANCE SKETCH NO. 23263-K. THIS COVER HAS PROVISION FOR A 1/8 NPTF GREASE FITTING. USE WITH "O" RING P/N 154057 AND SNAP RING 354386 OR EQUIVALENT. (COVER 23263-K NOT MANUFACTURED BY SPERRY VICKERS - FOR CUSTOMER INFORMATION ONLY.)



IF CUSTOMER INSTALLATION USES NO BEARINGS IN THE MOTOR, SPLINE GREASE RETENTION MAY BE OBTAINED BY USING A SHAFT SEAL ADAPTER MOUNTED IN THE BEARING BORE WITH "O" RING 154057 AND SNAP RING 354386 OR EQUIVALENT. SEE DESIGN ASSISTANCE SKETCH 23262-K FOR ADAPTER. SUGGESTED SHAFT SEAL SIZE 4.125 ID (ADAPTER 23262-K NOT MANUFACTURED BY SPERRY VICKERS - FOR CUSTOMER INFORMATION ONLY.)

#### CIRCUIT

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#### FLUIDS

**PETROLEUM OILS.** - SELECT ANTIWEAR TYPE INDUSTRIAL HYDRAULIC OILS OR AUTOMOTIVE CRANKCASE OILS WITH A NORMAL VISCOSITY OF 150 TO 315 SUS AT 100° F. AND HAVING LETTER DESIGNATION "SC, SD, OR SE" PER SAE TECHNICAL REPORT J183a. OPERATING VISCOSITY RANGE IS 70 TO 250 SUS. OPERATING TEMPERATURE OF 120° F. TYPICAL TO 180° F. MAXIMUM IS RECOMMENDED. REFER TO DATA SHEET 1-286-S (SECTION L) FOR HYDRAULIC FLUID AND TEMPERATURE RECOMMENDATIONS.

**WATER-CONTAINING FLUIDS.** - WATER GLYCOLS (NOT WATER-IN-OIL EMULSIONS) AS PRODUCED BY RESPONSIBLE SOURCES FOR RATINGS GIVEN HEREIN, ARE RECOMMENDED. SELECT FLUIDS WITH A VISCOSITY AS CLOSE AS POSSIBLE TO THAT OF PETROLEUM OIL DESCRIBED ABOVE. IT IS RECOMMENDED THAT TEMPERATURES FOR WATER BASE FLUIDS BE LIMITED TO A MAXIMUM OF 130° F.

**SYNTHETIC FIRE RESISTANT FLUIDS.** - PHOSPHATE ESTERS AND BLENDS AS PRODUCED BY RESPONSIBLE SOURCES FOR RATINGS GIVEN HEREIN ARE RECOMMENDED. SELECT FLUIDS WITH VISCOSITY AS CLOSE AS POSSIBLE TO THAT FOR PETROLEUM OIL DESCRIBED ABOVE. THE FLUID MUST BE COMPATIBLE WITH SEALS OF FLUOROCARBON AND SILICONE ELASTOMERS. (I.E. VITON, ETC.). TO OBTAIN MOTORS EQUIPPED FOR OPERATION WITH SYNTHETIC FIRE RESISTANT FLUIDS, ADD THE PREFIX "F3" TO THE MODEL NUMBER.

42 FLUID FILTRATION. .... 35 MICRONS ABSOLUTE OR FINER

43 CIRCUIT DESIGN SHOULD PROTECT MOTOR FROM PRESSURE SURGES AND/OR CAVITATION.



CASE OUTLET FLOW LINE MUST BE UNRESTRICTED AND SIZED SUCH THAT CASE PRESSURE AT MOTOR NEVER EXCEEDS 25 PSI MAX. EITHER OR BOTH CASE OUTLETS MAY BE USED. LEAVE OTHER PLUGGED.



45 INTERMITTENT (15 MINUTES OR LESS) UNLOADED RUNNING IS PERMITTED AFTER PROPER START AND WARM UP, TO 50 RPM.



IF APPLICATION REQUIRES MOTOR TO RUN UNLOADED, CASE OUTLET FLOW MUST BE UNRESTRICTED AND MUST BE CHECKED FOR MINIMUM OF 10 GPM. IF NECESSARY, CASE FLOW MAY BE INCREASED BY BACK PRESSURE AT THE MOTOR OUTLET PORT, OR USE LOWER VISCOSITY FLUID OR HIGHER FLUID TEMPERATURE.



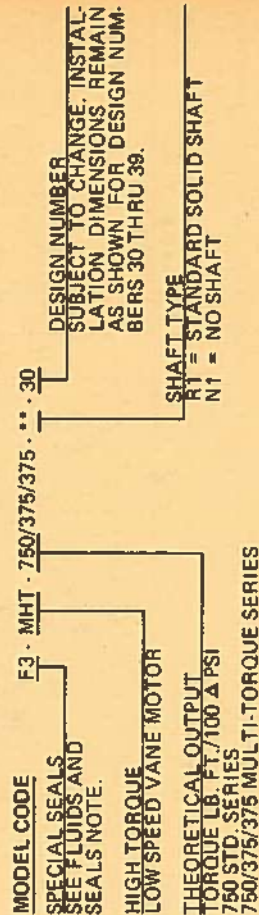
47 THERMAL SHOCKS IN EXCESS OF 50° F. ARE NOT RECOMMENDED. WHEN MOTOR IS COLD AND OIL IS HOT, START AND STOP MOTOR UNTIL TEMPERATURES ARE EQUALIZED. CASE FLOW MUST BE PRESENT.

48

NOTE: IT IS GOOD PRACTICE TO LUBRICATE THE INTERNAL PARTS OF THESE NEW UNITS WITH HYDRAULIC FLUID BEFORE START-UP. ADD THE HYDRAULIC FLUID USED, TO THE INLET, OUTLET, OF THE MHT MOTORS PRIOR TO STARTING. FOR MORE COMPLETE INFORMATION ON START-UP, PLEASE CONTACT YOUR LOCAL SPERRY VICKERS REPRESENTATIVE.



FOR MULTI-TORQUE AND MULTI-SPEED OPERATION IT IS PREFERRED THAT THE "B" SINGLE PORT BODY BE USED AS INLET. IF BI-DIRECTIONAL ROTATION IS REQUIRED, USE THE "B" PORT FOR PRIMARY DIRECTION OF ROTATION. WHEN "B" PORT IS INLET THE IDLING "A" PORT MUST BE CONNECTED TO THE "B" PORT. SEE DIAGRAMS BELOW.



#### STANDARD GRAPHICAL SYMBOLS FOR FLUID POWER DIAGRAMS



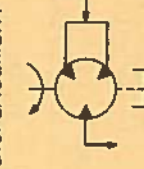
STANDARD MOTOR

#### MULTI-TORQUE MOTORS

MOTOR INSTALLATION POSSIBILITIES FOR FULL AND PARTIAL DISPLACEMENT AND BOTH DIRECTIONS OF ROTATION.

ONE ROTATION

FULL DISPLACEMENT

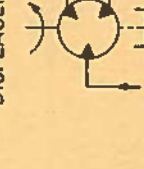


PARTIAL DISPLACEMENT

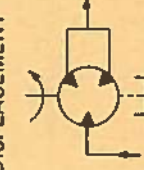


OPPOSITE ROTATION

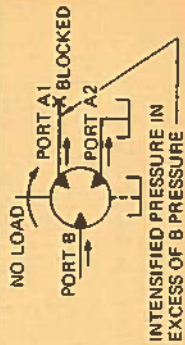
FULL DISPLACEMENT



PARTIAL DISPLACEMENT



NOTE: USE OF CHECK VALVE DEPENDS ON CIRCUIT NEEDS.



CAUTION: AVOID CIRCUITS WHERE ANY CONDITIONS COULD CAUSE INTENSIFIED PRESSURE. MULTI-DISPLACEMENT MOTORS LIKE CYLINDERS, CAN EXPERIENCE INTENSIFIED PRESSURES UNDER SOME CIRCUIT CONDITIONS SUCH THAT PRESSURES WILL EXCEED THE MOTOR, PIPING OR VALVE RATING. EXAMPLE AT RIGHT:



**SPERRY VICKERS**  
T.M.

# **HYDRAULIC VANE MOTORS**

MODEL SERIES MHT-1000-\*\*-30  
HIGH TORQUE - LOW SPEED  
FIXED DISPLACEMENT

THE NUMBERED TRIANGLES POINT OUT AREAS  
OF THE MOTORS WHERE SPECIFIC INFORMATION  
IS KEYS ON PAGES 520280-1 AND -2.

.750-10 UNC-28 MOUNTING HOLES  
6 PLACES EQUALLY SPACED AS SHOWN  
MOUNTING SCREW PENETRATION  
1.50 MAX. TORQUE TO 70-80 LB.-FT. OILED

.750-10 UNC-2A STUDS 20.75 LONG  
6 PLACES EQUALLY SPACED  
AS SHOWN FROM EACH SIDE

15° REF.

SPLINE GREASE  
RETAINER  
INFORMATION

COVER  
INFORMATION

ROTOR  
SPLINE

75 TYP.

3.63  
3.55  
TYP.

15.67  
15.45  
(CAST DIM)

13.50 D.  
B.C.  
REF.

16.02  
15.81  
CAST  
DIM.

15° REF.

1.001  
1.000

3.998 D.  
3.997

4.441  
4.431

CLOCKWISE  
ROTATION

PORT "A" & PORT "B"  
STANDARD SAE  
2.50 DIA. 4 BOLT  
FLANGE  
NOTE THD. DEPTH

5.00  
KEY  
LGTH

500-13 UNC-28  
1.00 MIN. THD. (4 PLACES)  
(FOR LIFTING HOOK INSTALLATION)

4.06  
4.06  
4.06

5.78  
2.00  
REC.  
ENG'T.

4 FLANGE MOUNTING HOLES  
2 PLACES

500-13 UNC-28 - 1.25 DEEP

19.43  
19.29

6.51  
6.85

30.37  
30.17

23.85  
23.63

1.46  
1.38 BOTH BODIES

SEE DETAIL "A"

5.00 DIA. SHAFT  
CLEARANCE  
BOTH BODIES

6.2992  
6.3007

C'BORE &  
PILOT DIA.  
BOTH BODIES

1.747 TYP.  
4.772 TYP.  
6.519 TYP.

10.377 PILOT  
10.373 DIA.  
TYP.

8.87 DIA.  
TYP.

4.62  
8.12 BOTH BODIES

1.747 TYP.  
6.519 TYP.

4.772 TYP.

8750-14 UNF-28 SAE  
INTERNAL STRAIGHT  
THREAD - 2 PLACES (DRAIN CONNECTION)

16.67  
16.45

1.406 TYP.  
70 TYP.

1.38 TYP.  
2.750 TYP.

3.240  
3.240

500-13 UNC-28 - 4 FLANGE  
MOUNTING HOLES - 2 PLACES  
1.06 DEEP

2.23  
2.15

NOTE: ALL OTHER DIMENSIONS  
& VIEWS SAME AS ABOVE.

PORT "B"

18.99  
18.87

1.010 R.  
0.060 R.

NOTE: .15 SINGLE PORT BODY  
.30 TWO PORT BODY

20°

DETAIL "A" BOTH MODELS

.031 DEEP  
BODY U' CUT

.34/.24 - MAX. PENETRATION  
OF MATING PILOT: .230

1.135  
1.10

REVISED 12-1-78

520280

**SPERRY VICKERS**  
T.M.  
TROY, MICHIGAN 48064

VANE MOTORS  
HIGH TORQUE  
LOW SPEED

THEORETICAL TORQUE  
SINGLE 1000 LB. FT.  
MULTI 1000 & 500 LB. FT.

THEORETICAL DISPLACEMENT  
SINGLE 754 CU. IN./REV.  
MULTI 754 & 377 CU. IN./REV.

SPEED  
RANGE  
0-100

DWG. NO.  
520280



## GENERAL DATA

THE MHT 1000 SERIES MOTORS ARE HIGH-TORQUE LOW-SPEED VANE MOTORS. THEY ARE CAPABLE OF SMOOTH SPEEDS THROUGHOUT THEIR ENTIRE PRESSURE AND SPEED RANGES. THEY WILL PERFORM EQUALLY WELL IN EITHER DIRECTION OF ROTATION.

THE MHT 1000 PROVIDES A SINGLE DISPLACEMENT, ONE SPEED AND ONE TORQUE FOR A GIVEN FLOW AND PRESSURE.

THE MHT-1000/500 IS A MULTI-TORQUE MOTOR. THE MULTI-DISPLACEMENT FEATURE PROVIDES FOR SELECTION OF TWO SPEED OPERATION FOR A GIVEN FLOW, AND TWO TORQUE CAPACITIES CORRESPONDING TO THE SPEEDS. SEE RATINGS BELOW AND ITEM 49.

## ROTATION

FLUID TO PORTS "A" GIVES CW ROTATION.  
FLUID TO PORT "B" GIVES CCW ROTATION.

## RATINGS

	NOMINAL SIZE		
	THEORETICAL DISPLACEMENT (IN. 3/REV.)		
	1000	754	500
	THEORETICAL OUTPUT TORQUE PER 100 PSI DIFFERENTIAL (LB. FT.)		
	1000	754	500

CASE PORT PRESSURE (PSI) MAX. .... 0-25  
MAXIMUM ROTATING PRESSURE ..... 2000 PSI  
MAXIMUM SPEED AT 2000 PSI DIFFERENTIAL ..... 100 RPM  
MAXIMUM BREAKAWAY PRESSURE (STALL-NO ROTATION) ..... 2750 PSI  
MAXIMUM PRESSURE TO INLET OR OUTLET PORT ..... 2750 PSI  
MAXIMUM SUM OF PRESSURE AT INLET & OUTLET PORTS ..... 2750 PSI  
PERFORMANCE DATA FOR SPECIFIC APPLICATIONS AVAILABLE ON REQUEST FROM YOUR SPERRY VICKERS APPLICATION ENGINEER.

## BEARING DATA

BEARING CAPACITY (RADIAL OR AXIAL) ..... 12520 LBS. AF8MA @ 33-1/3 RPM,  
500 HOURS 8-10 LIFE, 6000 LBS. @ 60 RPM, 15000 HOURS AVERAGE LIFE (UNRELATED TO MOTOR LIFE).

## APPROXIMATE INERTIA OF ROTATING GROUP

WITHOUT SHAFT ..... 3780 LB.-IN. 2  
WITH SHAFT ..... 4115 LB.-IN. 2

## BRAKING

UNITS AT FULL DISPLACEMENT MAY BE USED AS A BRAKE WITHIN MOTOR RATINGS. INLET SUPERCHARGE SHOULD BE AT LEAST 100 PSI, ESPECIALLY ABOVE 50 RPM, TO PREVENT CAVITATION. PARTIAL DISPLACEMENT BRAKING IS NOT APPROVED.

WEIGHT LBS. (APPROX.) SHAFTLESS ..... 962  
WITH SHAFT ..... 1120

## MOUNTING

1 MOTOR HOUSING WILL ACCEPT NO AXIAL LOADING EXCEPT AT 13.50 DIA. BOLT CIRCLE.

2 CUSTOMER MOUNTING SURFACE SHALL BE FLAT WITHIN .001 IN. AND PERPENDICULAR TO AXIS WITHIN .001 TIR.

3 THE SPLINED ROTOR WILL NOT ACCEPT ANY SHAFT-TRANSLATION, (SLIDING AXIALLY THRU SPLINE), WHEN MOTOR IS LOADED (PRODUCING TORQUE).

4 IF THE SHAFT MUST ABSORB AXIAL FORCES, PRELOADING MAY BE REQUIRED TO PREVENT ANY TRANSLATION. (CONSULT SPERRY VICKERS APPLICATION ENGINEER.)

5 IF THE APPLICATION REQUIRES THE MOUNTING FACE TO BE SEALED, AN AREA HAS BEEN PROVIDED FOR USE WITH A 11.00 ID "O" RING SUCH AS SPERRY VICKERS P/N 199838 OR EQUIVALENT.

6 MOTORS MAY BE SUPPLIED WITH THREADS DRILLED OUT OF MOUNTING SURFACE BODY FOR THROUGH MOUNTING WITH STANDARD STUDS OR SCREWS. IF REQUIRED, THRU SCREWS MUST BE TORQUED TO 150 ±15 LB. FT. OILED THRU

STUDS OR SCREWS NOT FURNISHED. S13 - THREADS DRILLED FROM SHAFT END BODY; S18 - FROM HEAD END BODY.

CONVENTIONAL MOUNTING IS WITH SIX SCREWS THRU BACK OF MOUNTING PLATE, 1.50 MAX. INTO MOTOR. TORQUE TO 70-80 LB.-FT. OILED.

8 MOTOR MOUNTING ORIENTATION IS UNRESTRICTED AS TO PORT LOCATION AND MOUNTING FACE. THE SHAFT MAY PROTRUDE FROM EITHER BODY.

9 PILOT MUST BE A NON-BINDING SLIP FIT, AND SHALL NOT EXCEED .230 MAX. INTO MOTOR.

10 THESE 30 DESIGN MOTORS CAN BE MADE INTERCHANGEABLE WITH PRECEDING DESIGNS. SEE DESIGN ASSISTANCE SKETCH 23267-K.

11 DOWEL HOLES .750 DIA. 1.00 DEEP MAY BE ADDED BY CUSTOMER AT ANY TWO (180° APART) OF THESE SIX MOUNTING HOLES IF REQUIRED, ON EITHER BODY.

12 ROTOR SPLINES MUST BE KEPT IN FACTORY ALIGNMENT. DO NOT ROTATE ONE WITH RESPECT TO THE OTHER.

13 PILOT MUST BE A NON-BINDING SLIP FIT AND SHALL NOT EXCEED .130 MAXIMUM INTO MOTOR.

## SHAFT DATA

22 CUSTOMER SHAFT DESIGN MUST PROVIDE SPLINE GREASE RETENTION. SPLINE IS NOT LUBRICATED BY SYSTEM FLUID. CUSTOMER SHAFT NEEDS NO SHAFT SEAL SURFACE FOR SYSTEM FLUID RETENTION.

SHAFT SPLINE MUST SLIP FIT INTO ROTORS.

SHAFT SPLINE DATA -

## EXTERNAL INVOLUTE SPLINE

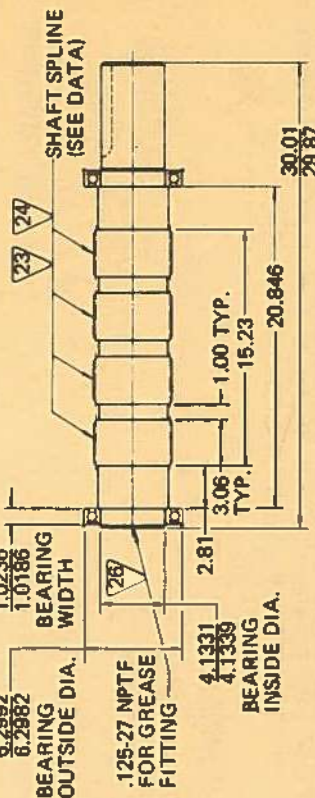
FILLET ROOT - SIDE FIT  
PITCH DIA. - 4.8000 REF.  
BASE DIA. - 4.1569 REF.

NO. OF TEETH - 48  
DIAMETRAL PITCH - 10/20  
PRESSURE ANGLE - 30°

FORM DIA. - 4.6904  
MAJOR DIA. - 4.9000/4.8950  
MINOR DIA. - 4.6200/4.6050

FILLET RADII - .040 REF.  
CIRCULAR TOOTH THICKNESS - .1517 MAX. ACT. REF.  
.1501 MIN. ACT.  
.1538 MAX. EFF.  
1522 MIN. EFF. REF.

MEASUREMENT OVER .1920 PINS:  
5.0916 MAX. REF.  
5.0890 MIN. REF.



24 WHEN DISASSEMBLING OR INSTALLING A SHAFT, THERE SHALL BE NO BINDING AND NO AXIAL FORCE APPLIED TO THE ROTOR.

25 WITH A SHAFTLESS ASSEMBLY, THE CUSTOMER SHAFT SHALL PROVIDE ITS OWN BEARINGS, AND CENTER THE ROTOR WITH .004 TIR CONCENTRICITY TO THE PILOT DIAMETERS.





THE SHAFT SPLINE SHOULD BE PACKED WITH FIBROUS WHEEL-BEARING GREASE AT SIX MONTH INTERVALS, OR SOONER IF OPERATION IS AT HIGH TEMPERATURE. STANDARD 1/8 NPTF GREASE FITTINGS ARE INSTALLED IN THE TOP SPACER SECTIONS FOR THIS PURPOSE. ALSO A STANDARD 1/8 NPT GREASE FITTING MAY BE INSTALLED AT THE END OF THE SHAFT, FOR THE SAME PURPOSE.



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#### CIRCUIT

41

#### FLUIDS

PETROLEUM OILS - SELECT ANTIWEAR TYPE INDUSTRIAL HYDRAULIC OILS OR AUTOMOTIVE CRANKCASE OILS WITH A NORMAL VISCOSITY OF 150 TO 315 SUS AT 100° F. AND HAVING LETTER DESIGNATION "SC, SD, OR SE" PER SAE TECHNICAL REPORT J183a. OPERATING VISCOSITY RANGE IS 70 TO 250 SUS. OPERATING TEMPERATURE OF 120° F. TYPICAL TO 180° F. MAXIMUM IS RECOMMENDED. REFER TO DATA SHEET 1-286-S (SECTION L) FOR HYDRAULIC OIL RECOMMENDATIONS.

WATER-CONTAINING FLUIDS - WATER GLYCOLS (NOT WATER-IN-OIL EMULSIONS) AS PRODUCED BY RESPONSIBLE SOURCES FOR RATINGS GIVEN HEREIN, ARE RECOMMENDED. SELECT FLUIDS WITH A VISCOSITY AS CLOSE AS POSSIBLE TO THAT OF PETROLEUM OIL DESCRIBED ABOVE. IT IS RECOMMENDED THAT TEMPERATURES FOR WATER BASE FLUIDS BE LIMITED TO A MAXIMUM OF 130° F.

SYNTHETIC FIRE RESISTANT FLUIDS - PHOSPHATE ESTERS AND BLENDS AS PRODUCED BY RESPONSIBLE SOURCES FOR RATINGS GIVEN HEREIN ARE RECOMMENDED. SELECT FLUIDS WITH VISCOSITY AS CLOSE AS POSSIBLE TO THAT OF PETROLEUM OIL DESCRIBED ABOVE. THE FLUID MUST BE COMPATIBLE WITH SEALS OF FLUOROCARBON AND SILICONE ELASTOMERS, (I.E. VITON, ETC.). TO OBTAIN MOTORS EQUIPPED FOR OPERATION WITH SYNTHETIC FIRE RESISTANT FLUIDS, ADD THE PREFIX "F3" TO THE MODEL NUMBER.

42 FLUID FILTRATION. .... 35 MICRONS ABSOLUTE OR FINER

43 CIRCUIT DESIGN SHOULD PROTECT MOTOR FROM PRESSURE SURGES AND/OR CAVITATION.

44 CASE OUTLET FLOW LINE MUST BE UNRESTRICTED AND SIZED SUCH THAT CASE PRESSURE AT MOTOR NEVER EXCEEDS 25 PSI MAX. EITHER OR BOTH CASE OUTLETS MAY BE USED. LEAVE OTHER PLUGGED.

45 INTERMITTENT (15 MINUTES OR LESS) UNLOADED RUNNING IS PERMITTED AFTER PROPER START AND WARM UP, TO 50 RPM.

46 IF APPLICATION REQUIRES MOTOR TO RUN UNLOADED, CASE OUTLET FLOW MUST BE UNRESTRICTED AND MUST BE CHECKED FOR MINIMUM OF .10 GPM. IF NECESSARY, CASE FLOW MAY BE INCREASED BY BACK PRESSURE AT THE MOTOR OUTLET PORT, OR USE LOWER VISCOSITY FLUID OR HIGHER FLUID TEMPERATURE.

47 THERMAL SHOCKS IN EXCESS OF 50° F. ARE NOT RECOMMENDED. WHEN MOTOR IS COLD AND OIL IS HOT, START AND STOP MOTOR UNTIL TEMPERATURES ARE EQUALIZED. CASE FLOW MUST BE PRESENT.

48

NOTE: IT IS GOOD PRACTICE TO LUBRICATE THE INTERNAL PARTS OF THESE NEW UNITS WITH HYDRAULIC FLUID BEFORE START-UP. ADD THE HYDRAULIC FLUID USED, TO THE INLET, OUTLET, OF THE MHT MOTORS PRIOR TO STARTING. FOR MORE COMPLETE INFORMATION ON START-UP, PLEASE CONTACT YOUR LOCAL SPERRY VICKERS REPRESENTATIVE.

FOR MULTI-TORQUE AND MULTI-SPEED OPERATION IT IS PREFERRED THAT THE "B" SINGLE PORT BODY BE USED AS INLET. IF BI-DIRECTIONAL ROTATION IS REQUIRED, USE THE "B" PORT FOR PRIMARY DIRECTION OF ROTATION. WHEN "B" PORT IS INLET THE IDLING "A" PORT MUST BE CONNECTED TO THE "B" PORT. SEE DIAGRAMS BELOW.

#### MODEL CODE

SPECIAL SEALS AND SEE FLUIDS AND SEALS NOTE.  
F3 - MHT - 1000/500/500 - 30 - S\*  
HIGH TORQUE  
LOW SPEED VANE MOTOR  
THEORETICAL OUTPUT  
TORQUE 18 FT. LBS. 100 A PSI  
1000 - 1000 SINGLE SERIES  
500 - 1000/500/500 MULTI-TORQUE SERIES  
R1 - STANDARD SOLID SHAFT  
N1 - NO SHAFT  
DESIGN NUMBER  
SUBJECT TO CHANGE. INSTALLATION DIMENSIONS REMAIN AS SHOWN FOR DESIGN NUMBERS 30 THRU 39.  
DENOTES SPECIAL UNIT OMIT IF STANDARD

#### STANDARD GRAPHICAL SYMBOLS FOR FLUID POWER DIAGRAMS



STANDARD MOTOR

#### MULTI-TORQUE MOTORS

MOTOR INSTALLATION POSSIBILITIES FOR FULL AND PARTIAL DISPLACEMENT AND BOTH DIRECTIONS OF ROTATION.

ONE ROTATION

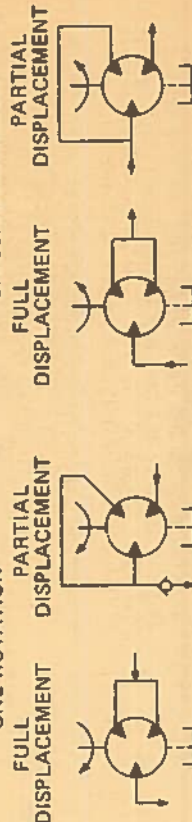
FULL DISPLACEMENT

PARTIAL DISPLACEMENT

OPPOSITE ROTATION

FULL DISPLACEMENT

PARTIAL DISPLACEMENT



NOTE: USE OF CHECK VALVE DEPENDS ON CIRCUIT NEEDS.



CAUTION: AVOID CIRCUITS WHERE ANY CONDITIONS COULD CAUSE INTENSIFIED PRESSURE. MULTI-DISPLACEMENT MOTORS LIKE CYLINDERS, CAN EXPERIENCE INTENSIFIED PRESSURES UNDER SOME CIRCUIT CONDITIONS SUCH THAT PRESSURES WILL EXCEED THE MOTOR, PIPING OR VALVE RATING. EXAMPLE AT RIGHT:

520280-2



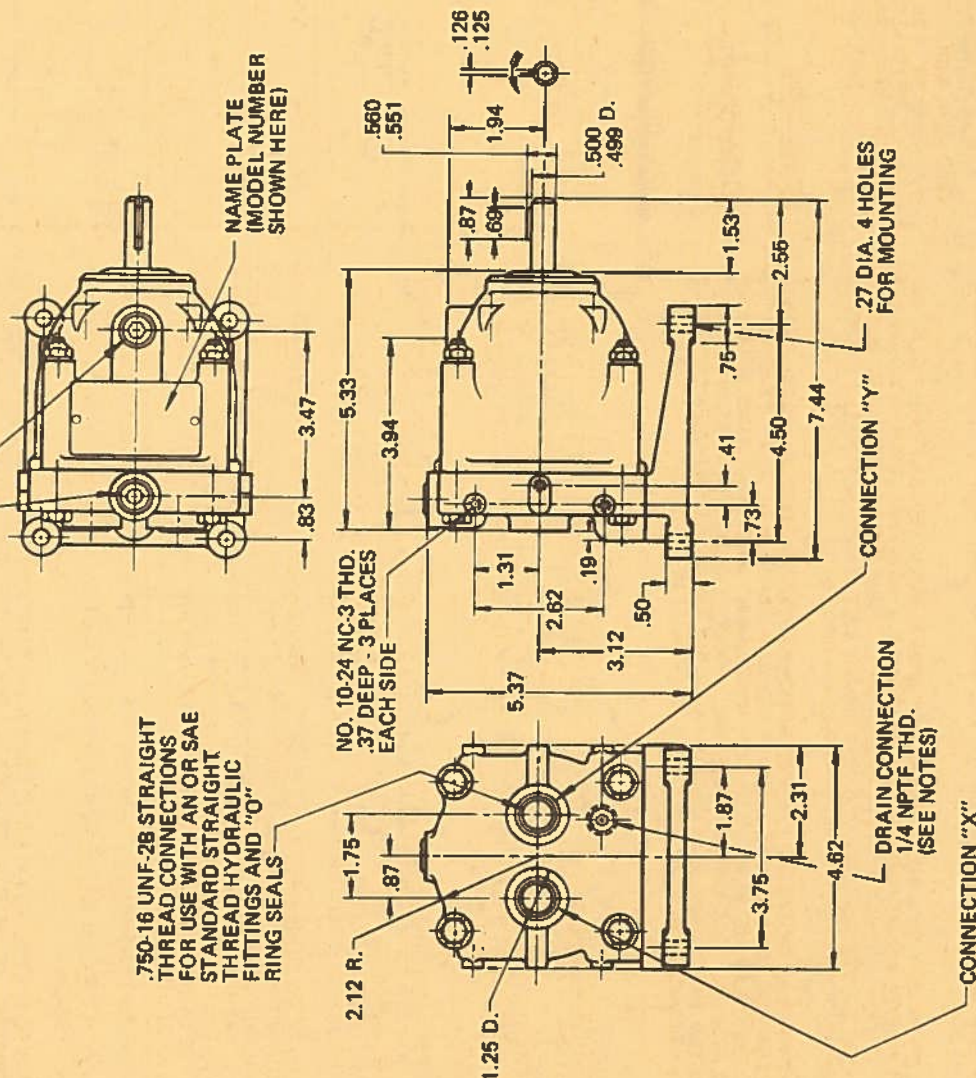
MODEL MTR3-F13-20

DRAIN CONNECTIONS

3/8 NPTF THD.  
(SEE INSTALLATION NOTE FOR  
INSTRUCTIONS IN THE USE OF  
THIS CONNECTION. PLUG  
CONNECTION NOT USED.)

GENERAL USAGE FOR CONVERSION OF HYDRAULIC POWER TO REVERSIBLE, VARIABLE SPEED, ROTARY MECHANICAL POWER. OPERATION MAY BE USED IN A CLOSED CIRCUIT SUPERCHARGED TO 30 PSI OR IN AN OPEN CIRCUIT WITH MEANS OF MAINTAINING 30 PSI BACK PRESSURE ON THE OUTLET LINE. OPERATION MAY BE CONTINUOUS, INTERMITTENT, OR STOPPED WITHOUT DAMAGE TO THE MOTOR WHEN PROTECTED BY PROPER OVERLOAD RELIEF VALVE SETTING.

750-16 UNF-28 STRAIGHT  
THREAD CONNECTIONS  
FOR USE WITH AN OR SAE  
STANDARD STRAIGHT  
THREAD HYDRAULIC  
FITTINGS AND "O"  
RING SEALS



# INSTALLATION

HORIZONTAL MOUNTING IS RECOMMENDED TO MAINTAIN NECESSARY CASE FLUID LEVEL. THE CASE DRAIN LINE MUST BE FULL SIZE UNRESTRICTED AND CONNECTED FROM THE UPPERMOST DRAIN PORT DIRECTLY TO THE RESERVOIR IN SUCH A MANNER THAT THE HOUSING REMAINS FILLED WITH FLUID. PIPING OF DRAIN LINE MUST PREVENT SIPHONING. PIPE DRAIN LINE SO THAT IT TERMINATES BELOW RESERVOIR FLUID LEVEL. NO OTHER LINES ARE TO BE CONNECTED TO THIS DRAIN LINE. CAUTION MUST BE EXERCISED TO NEVER EXCEED 6 PSI UNIT CASE PRESSURE. SEE DRAWING 508200 (SECTION C) FOR INSTRUCTIONS ON USING THE MTR3-F13-20 WITH THE PTR3-HR-13-20.

PERFORMANCE  
PRESSURE (MAX. GAGE)..... 500 PSI  
\*NOMINAL RATED SPEED..... 1800 RPM  
TORQUE MAX. CONTINUOUS..... 40 IN. LB.  
DISPLACEMENT (THEORETICAL)..... .645 CU. IN./REV.  
VOLUMETRIC EFFICIENCY..... 95%

FLUIDS  
USE CLEAN PETROLEUM ANTIWEAR INDUSTRIAL HYDRAULIC OIL, OR SAE 20W AUTOMOTIVE CRANKCASE OIL DESIGNATED SC, SD OR SE. TYPE "A" AUTOMOTIVE TRANSMISSION FLUID ALSO PERMISSIBLE. DRAIN AND REFILL WITH NEW OIL EVERY 2000 HOURS OF OPERATION OR 6 MONTHS, WHICHEVER OCCURS FIRST.

WEIGHT LBS. (APPROX.) DRY..... 10-1/4

\*FOR HIGHER SPEEDS OR FOR SPEEDS BELOW 100 RPM, CONSULT NEAREST SALES OFFICE.

MOTOR SPEED IS DEPENDENT ON THE VOLUME OF OIL SUPPLIED TO THE MOTOR.

REVISED 3-1-74

520295

FLUID MOTOR  
FIXED DISPLACEMENT

MULTIPLE PISTON  
ROTARY TYPE

40 IN. LB.  
MAX. TORQUE

FOOT  
MOUNTING

DRW. NO.  
520295

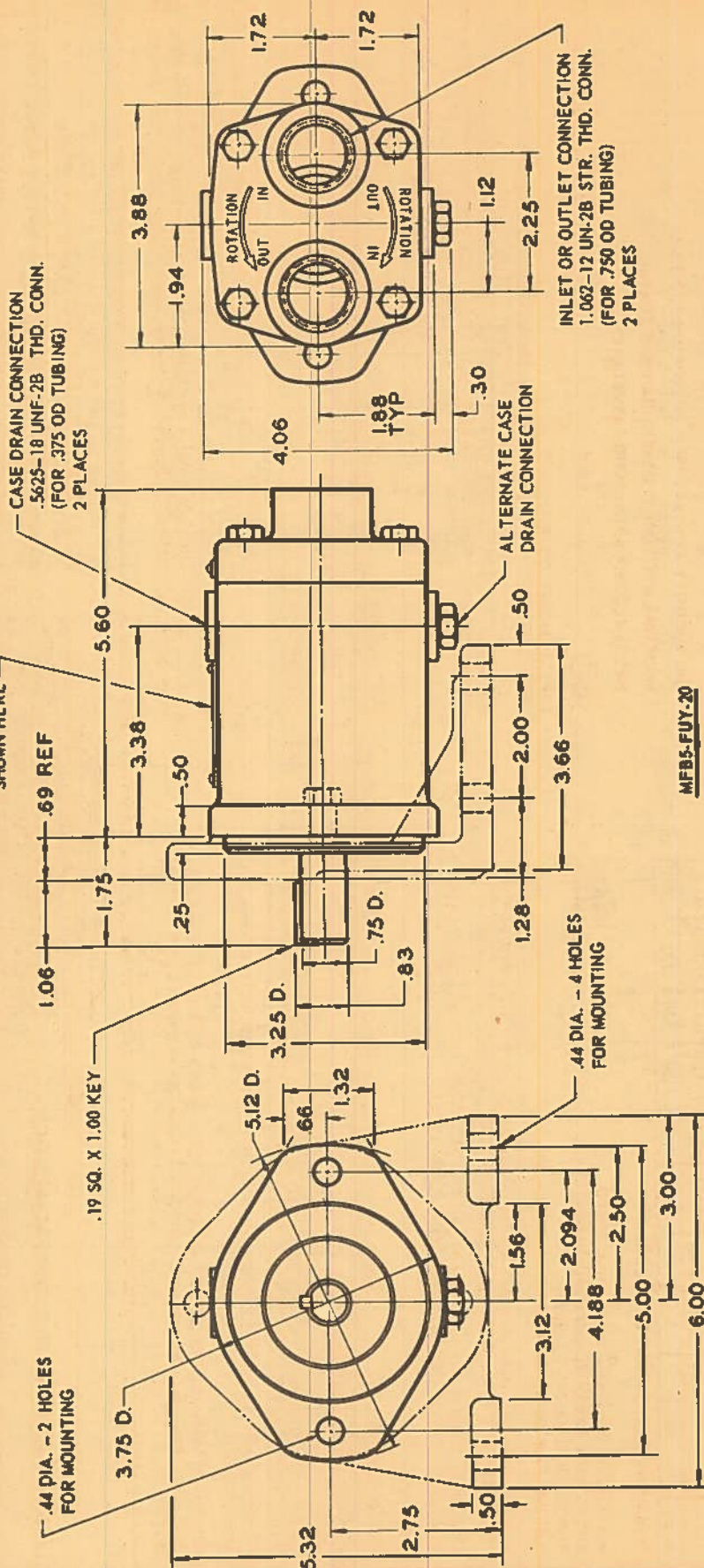


# VICKERS FIXED DISPLACEMENT, IN-LINE, PISTON MOTORS

## MODEL SERIES MFB5

### FOOT AND FLANGE MOUNTING

MODEL NUMBER  
SHOWN HERE



#### INSTALLATION

HORIZONTAL MOUNTING IS RECOMMENDED TO MAINTAIN NECESSARY CASE FLUID LEVEL. THE CASE DRAIN LINE MUST BE FULL SIZE UNRESTRICTED AND CONNECTED FROM THE UPPERMOST DRAIN PORT DIRECTLY TO THE RESERVOIR IN SUCH A MANNER THAT THE HOUSING REMAINS FILLED WITH FLUID. PIPING OF DRAIN LINE MUST PREVENT SIPHONING. PIPE DRAIN LINE SO THAT IT TERMINATES BELOW RESERVOIR FLUID LEVEL. NO OTHER LINES ARE TO BE CONNECTED TO THIS DRAIN LINE. CAUTION MUST BE EXERCISED TO NEVER EXCEED 5 PSI UNIT CASE PRESSURE.

#### STARTING

BEFORE STARTING, FILL CASE WITH SYSTEM FLUID THRU UPPERMOST DRAIN PORT. HOUSING MUST BE KEPT FULL AT ALL TIMES TO PROVIDE INTERNAL LUBRICATION.

REVISED 3-3-69 R.W.S.

520300

VICKERS DIVISION  
SPERRY RAND CORPORATION  
TROY, MICHIGAN

IN-LINE PISTON  
TYPE MOTOR

MFB5. FIXED  
DISPLACEMENT

3600 RPM  
270 LB-IN

FOOT & FLANGE  
MOUNTING

DWG NO.  
520300



## GENERAL DATA:

THESE MOTORS ARE OF THE AXIAL PISTON, FIXED DISPLACEMENT, IN LINE DESIGN RATED AT 5 G.P.M. AT 1800 R.P.M. AND 1500 PSI. THE UNIT CAN BE OPERATED IN EITHER DIRECTION OF ROTATION. FLOW DIRECTION IS AS INDICATED.

## SPECIFICATIONS:

FLUID - CLEAN PETROLEUM OIL MEETING OR EXCEEDING LUBRICATING QUALITIES OF SAE 10W, MEETING API SERVICE CLASSIFICATION MS (MAXIMUM SEVERITY) IS RECOMMENDED. RECOMMEND VISCOSITY RANGE 150 TO 225 SSU AT 100°F.

MODEL	THEORETICAL DISPLACEMENT CU. IN./REV.	FLOW-GPM FOR		OPERATING SPEED RPM	PRESSURE PSI		OUTPUT TORQUE LB. IN.
		RATED	MAX.		RATED	MAX.	
MFBS	.643	5	10	1800	1500	3000	135
				3600			270

\*SUM OF INLET & OUTLET PRESSURES

MINIMUM RECOMMENDED OPERATING SPEED ..... 100 RPM  
BREAK AWAY PRESSURE (NO LOAD AVERAGE) ..... 250 PSI  
THEORETICAL OUTPUT TORQUE  
(LB. INS. PER 100 PSI DIFFERENTIAL PRESSURE) ..... 10.2

ACTUAL RUNNING TORQUE - APPROXIMATELY 92% OF THE THEORETICAL OUTPUT TORQUE AT 1500 PSI DIFFERENTIAL PRESSURE.

STALLED TORQUE - APPROXIMATELY 70% OF THE THEORETICAL OUTPUT TORQUE AT 1500 AT 1500 PSI DIFFERENTIAL PRESSURE.

## FILTRATION

RECOMMENDED ..... 25 MICRON

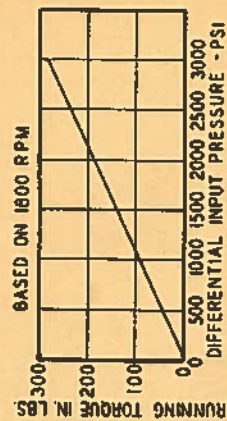
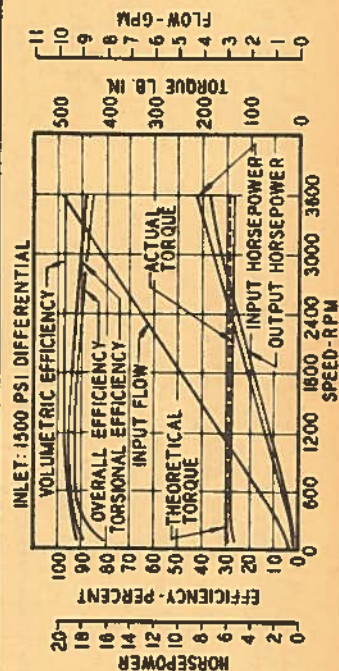
## OPERATING CHARACTERISTICS:

THIS UNIT IS OF THE VARIABLE HORSEPOWER CLASS, HORSEPOWER OUTPUT BEING APPROXIMATELY PROPORTIONAL TO RPM WITH A GIVEN CONSTANT OPERATING PRESSURE. SERVICE MAY BE CONTINUOUS, INTERMITTENT, CONTINUOUS REVERSING, OR STALLED WITHOUT DAMAGE WHEN PROPERLY PROTECTED BY A RELIEF VALVE.

OUTPUT SPEEDS ARE DEPENDENT ON INPUT FLOW. SPEED RANGES OF AT LEAST 36:1 ARE POSSIBLE AT MAXIMUM TORQUE RATING BY VARYING FLOW TO THE MOTOR.

## TYPICAL PERFORMANCE CHARACTERISTICS

BASED ON OIL TEMPERATURE OF 120°F -  
ATMOSPHERIC OUTLET

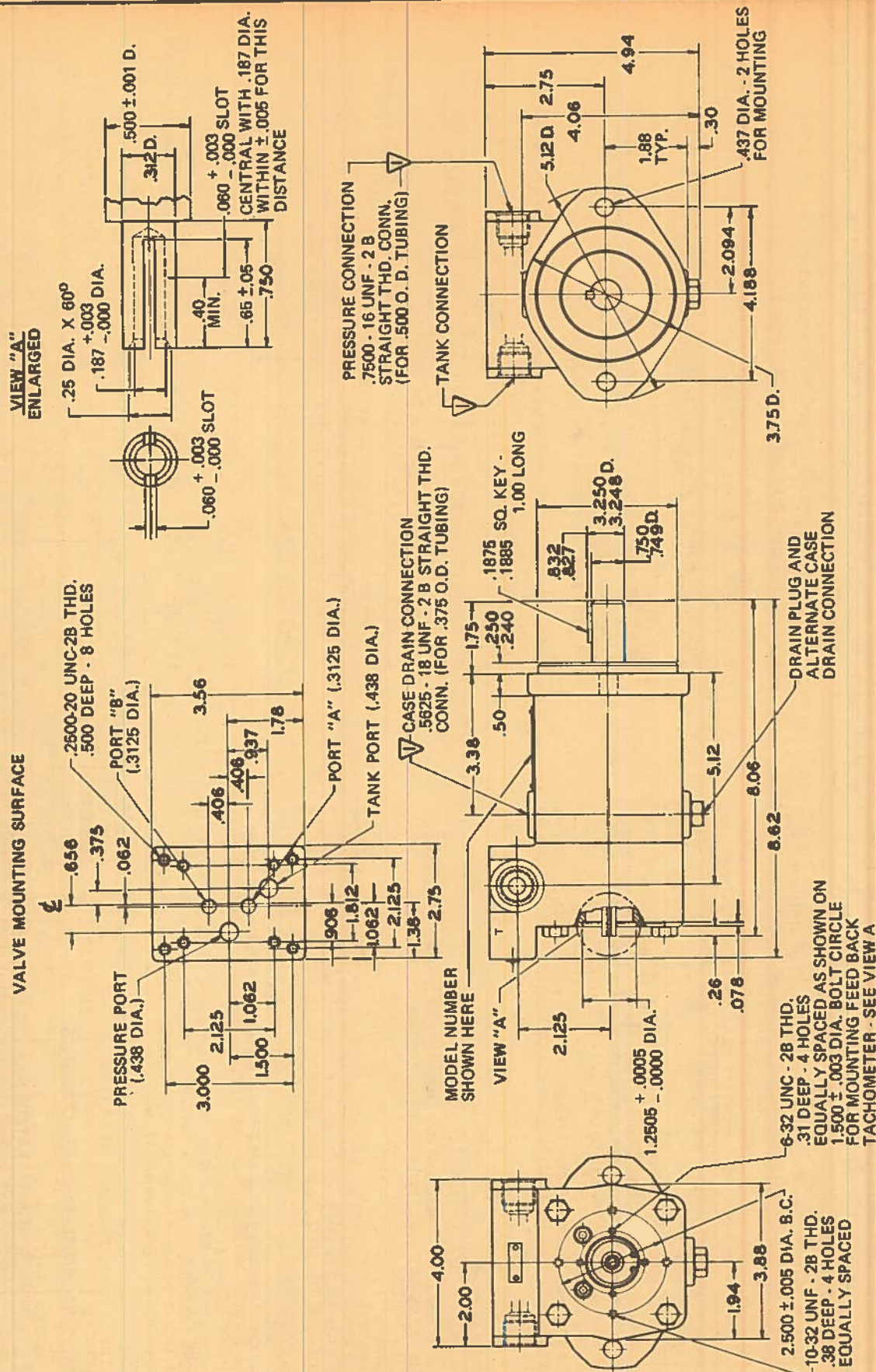


520300-1



# VICKERS®. INLINE PISTON SERVO MOTOR, FIXED DISPLACEMENT

**MODEL SERIES MFB5-U-20-S61  
FOOT OR FLANGE MOUNTING**



**DIRECTION OF ROTATION:**

**SECTION OF ROTATION**  
WITH PORT "A" AS INLET. ROTATION IS CLOCKWISE. LOOKING AT SHAFT END

**FOR USE WITH SAE STANDARD HYDRAULIC FITTINGS AND "O" RING SEALS**

RELEASED 2-1-70

520302

VICKERS DIVISION OF SPERRY RAND CORPORATION TROY, MICHIGAN 48064	INLINE PISTON SERVO MOTOR	SERIES MFB5 FIXED DISPLACEMENT	3600 RPM 270 LB. IN.	FOOT OR FLANGE MOUNTING	DWG. NO. 520302
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# INLINE PISTON SERVO MOTOR, FIXED DISPLACEMENT

MODEL SERIES MFB5-U-20-S61  
FOOT OR FLANGE MOUNTING

## GENERAL DATA

THIS MOTOR IS OF AXIAL PISTON, FIXED DISPLACEMENT INLINE DESIGN. THE MOTOR VALVE BLOCK PROVIDES A SURFACE FOR GASKET-MOUNTING VICKERS MODEL SF4 SERVO VALVE (DRAWING 501170). THUS, A COMPACT PACKAGE IS PROVIDED WITH A MINIMUM VOLUME OF OIL UNDER COMPRESSION. OTHER SERVO VALVES MAY BE USED WITH A SUITABLE ADAPTER PLATE. A THROUGH SHAFT IS PROVIDED IN THE VALVE BLOCK END TO ACCOMMODATE A FEED-BACK TACHOMETER (NOT PROVIDED).

## OPERATING CHARACTERISTICS:

THE MOTOR IS OF THE VARIABLE HORSEPOWER CLASS, HORSEPOWER OUTPUT BEING APPROXIMATELY PROPORTIONAL TO RPM WITH A GIVEN CONSTANT OPERATING PRESSURE. SERVICE MAY BE CONTINUOUS, INTERMITTENT, CONTINUOUS REVERSING, OR STALLED WITHOUT DAMAGE WITH PROPER TEMPERATURE AND RELIEF VALVE PROTECTION. OUTPUT SPEEDS ARE DEPENDENT ON INPUT FLOW.

## INSTALLATION

HORIZONTAL MOUNTING IS RECOMMENDED TO MAINTAIN NECESSARY CASE FLUID LEVEL. THE CASE DRAIN LINE MUST BE FULL SIZE UNRESTRICTED AND CONNECTED FROM THE UPPERMOST DRAIN PORT DIRECTLY TO THE RESERVOIR IN SUCH A MANNER THAT THE HOUSING REMAINS FILLED WITH FLUID. PIPING OF DRAIN LINE MUST PREVENT SIPHONING. PIPE DRAIN LINE SO THAT IT TERMINATES BELOW RESERVOIR FLUID LEVEL. NO OTHER LINES ARE TO BE CONNECTED TO THIS DRAIN LINE. CAUTION MUST BE EXERCISED TO NEVER EXCEED 5 PSI UNIT CASE PRESSURE.

## STARTING

BEFORE STARTING, FILL CASE WITH SYSTEM FLUID THRU UPPERMOST DRAIN PORT. HOUSING MUST BE KEPT FULL AT ALL TIMES TO PROVIDE INTERNAL LUBRICATION.

## SPECIFICATIONS:

FLUID - REFER TO DATA SHEET 1-286-S (SECTION L) FOR HYDRAULIC OIL RECOMMENDATIONS.

MODEL NO.	THEORETICAL DISPLACEMENT CU. IN./REV.	FLOW GPM AT 1500 PSI AND		OPERATING SPEED RPM		PRESSURE* PSI		OUTPUT TORQUE LB.-IN.	
		RATED RPM	MAX. RPM	RATED	MAX.	RATED	MAX.	RATED	MAX.
MFB-5	.643	5.2	10.2	1800	3600	1500	3000	135	270

\*SUM OF INLET AND OUTLET PRESSURES

OIL UNDER COMPRESSION (EACH PORT) ..... 1.12 IN.<sup>3</sup>  
THEORETICAL OUTPUT TORQUE  
(LB.-IN. PER 100 PSI DIFFERENTIAL PRESSURE) ..... 10.2

ACTUAL RUNNING TORQUE - APPROXIMATELY PROPORTIONAL TO DIFFERENTIAL PRESSURE (SEE CURVE).

STALLED TORQUE - 70% OF THE THEORETICAL OUTPUT TORQUE (APPROX. 107 LB.-IN. AT 1500 PSI DIFFERENTIAL PRESSURE).

FILTRATION  
RECOMMENDED ..... 25 MICRON

WEIGHT LBS. (APPROX.) ..... 11  
WITH FOOT MOUNTING ..... 15

THESE UNITS ARE DESIGNED TO MEET SPECIFICATIONS AS OUTLINED. TO INSURE MAXIMUM UNIT PERFORMANCE, IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION, CONSULT YOUR VICKERS APPLICATION ENGINEER IF YOUR:

PRESSURE REQUIREMENTS ARE ABOVE RATED PRESSURE OF 1500 PSI

SPEED IS ABOVE 1800 RPM RATING

OPERATING TEMPERATURE IS NOT WITHIN 100° F. TO 150° F.

APPLICATION REQUIRES AN INDIRECT DRIVE

NEEDS REQUIRE APPLICATION ASSISTANCE

MOUNTING ATTITUDE IS OTHER THAN HORIZONTAL

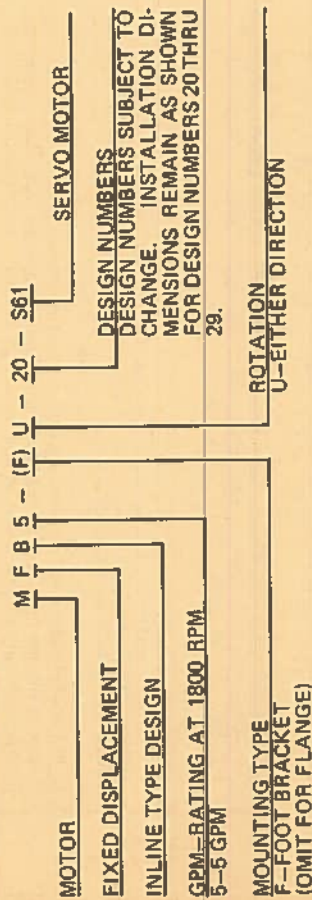
FLUID DOES NOT MEET REQUIREMENTS OF 1-286-S



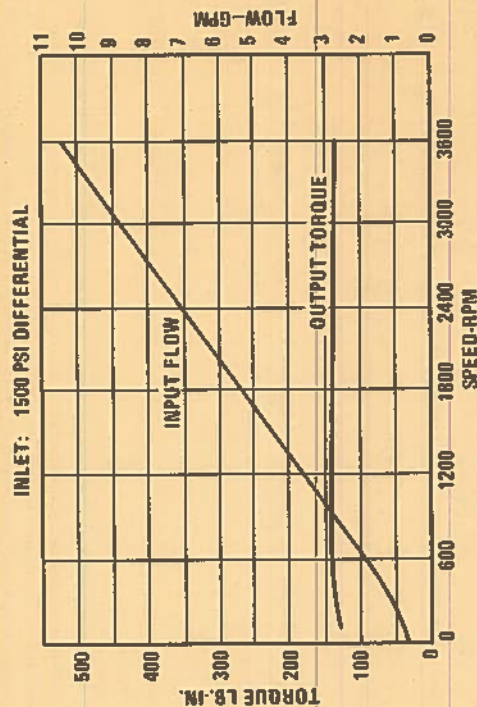
# INLINE PISTON SERVO MOTOR, FIXED DISPLACEMENT

MODEL SERIES MFBS-U-20-S61  
FOOT OR FLANGE MOUNTING

## TYPICAL MODEL CODE

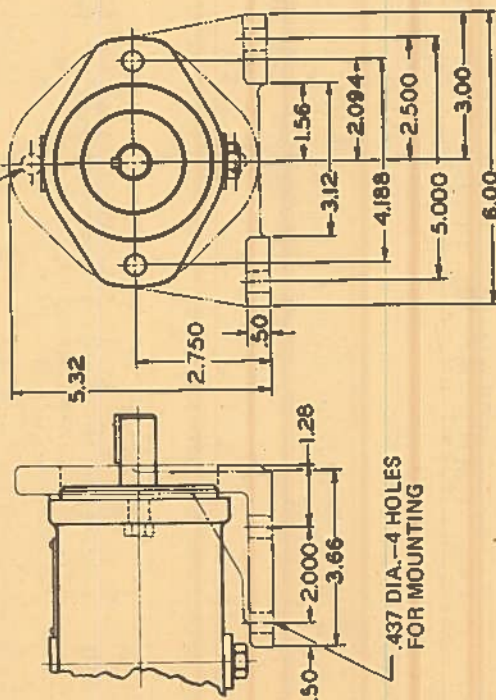


TYPICAL PERFORMANCE CHARACTERISTICS  
BASED ON OIL TEMP. OF 120° F.  
ATMOSPHERIC OUTLET

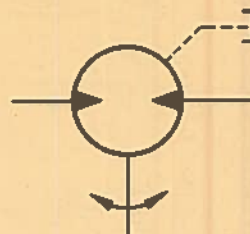


## FOOT MOUNTING

3/8 - 16 UNC-28 THD.  
4 HOLES



STANDARD GRAPHICAL SYMBOL  
FOR FLUID POWER DIAGRAMS





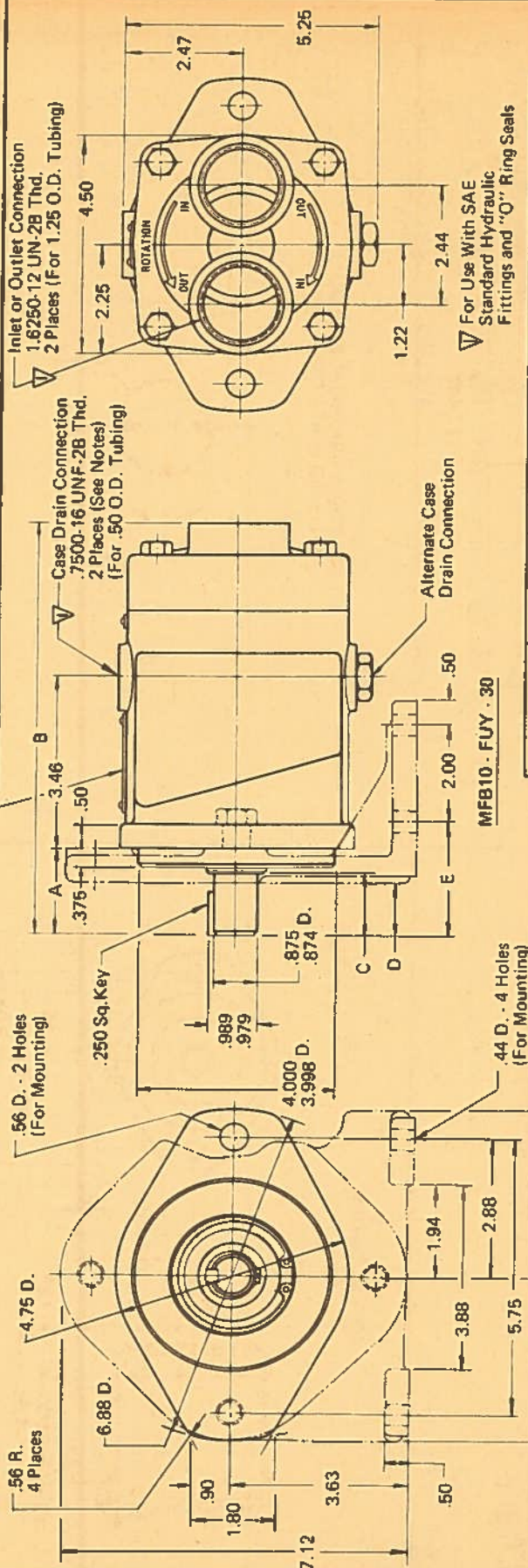
Model	A	B	C	D	E
MFB10-Y-30	2.31	8.98	1.874	—	—
MFB10-F-Y-30	2.31	8.98	1.874	1.61	2.90

**SPERRY VICKERS**™

# **FIXED DISPLACEMENT, IN-LINE, PISTON MOTORS**

MODEL SERIES MFB10-30

Model Number  
Shown Here



Fluid	Operating Temp F.	Input Flow GPM (Max.)	Operating Speed RPM (Max.)	Pressure PSI (Max.)	Output Torque Lb./in. (Max.)
Petroleum Oil	100 - 150	18	3200	3000	568
Synthetics (Phosphate Ester) ■	100 - 130	10	1800	2500	480
Emulsions (Water In Oil)					
Water Glycol					

- Sum of inlet and outlet pressures.
- Add prefix "F3" to model number.

A reduction of predicted life from that of petroleum oil should be expected when using fire-resistant fluids. The following percentages of life reduction as compared with petroleum, may be used.

Fluid Type	Reduction of Life
Synthetics (Phosphate Ester)	0 - 25%
Emulsions (Water In Oil)	20 - 30%
Water Glycol Fluids	40 - 60%

■ Refer to fluid and temperature data sheet 1286 S.

## **Installation**

Horizontal mounting is recommended to maintain necessary case fluid level. The case drain line must be full size unrestricted and connected from the uppermost drain port directly to the reservoir in such a manner that the housing remains filled with fluid. Piping of drain line must prevent siphoning. Pipe drain line so that it terminates below reservoir fluid level. No other lines are to be connected to this drain line. Caution must be exercised to never exceed 10 PSI unit case pressure.

## **Starting**

Before starting, fill case with system fluid thru uppermost drain port. Housing must be kept full at all times to provide internal lubrication.

REVISED 12-1-78

520305



# **General Data**

This motor is of the axial piston, fixed displacement, in-line design. Theoretical displacement is 1.29 cu. in./rev.

## **Operating Characteristics**

Unit is of the variable horsepower class. Horsepower output being approximately proportional to RPM with a given constant operating pressure. Service may be continuous, intermittent, continuous reversing, or stalled without damage when properly protected by relief valve.

Recommended minimum smooth running..... 100 RPM  
Break-away pressure nom. (no load)..... 320 PSI

## **Drive Rotation**

Motors will operate in either a clockwise or counterclockwise direction by reversing direction of fluid flow.

## **Filtration**

Recommended..... 35 Micron Absolute or Finer

## **Weight Approx. (Dry)**

Flange Mounting..... 21 Lbs.  
Foot Mounting..... 26 Lbs.

This unit is designed to meet specifications as outlined. To insure maximum inlet unit performance, in conjunction with your specific application, consult your local Sperry Vickers Representative if you:

Speed is below minimum recommended speed of 100 RPM. Minimum speed varies with conditions. Depending on application and circuit consideration, lower motor speeds are obtainable maintaining  $\pm 10\%$  speed variation.

Oil viscosity at operating conditions is not within 100 to 250 SSU.

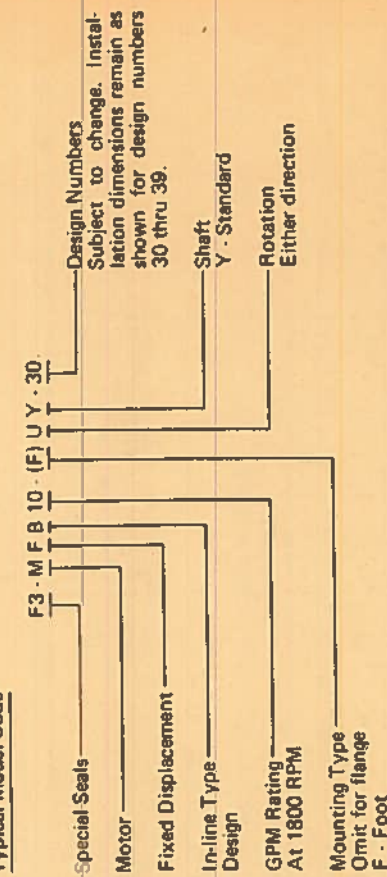
Oil viscosity at start-up is in excess of 1000 SSU.

Application involves rapid shaft reversals.

Mounting attitude is other than horizontal.

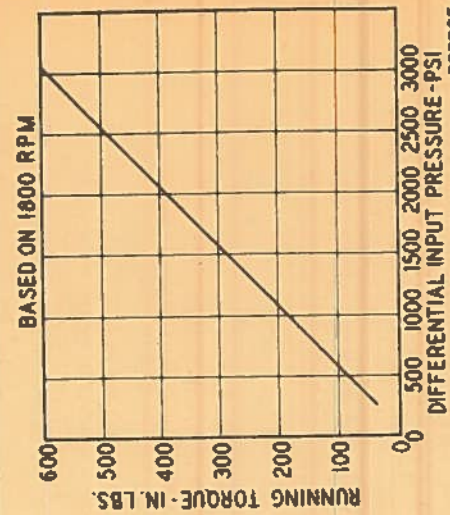
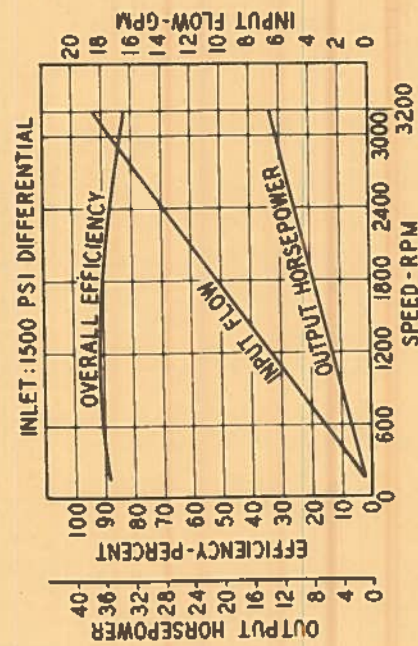
Needs require application assistance.

## **Typical Model Code**



## **PERFORMANCE CHARACTERISTICS**

BASED ON OIL TEMPERATURE OF 120 F. (100 SSU)  
AND AT ATMOSPHERE OUTLET





**FIXED DISPLACEMENT,  
IN-LINE, PISTON MOTORS**

**MODEL SERIES MFB20 AND MFB29.\*.10 DESIGN  
FLANGE OR FOOT MOUNTING**

## IN-LINE PISTON TYPE MOTOR

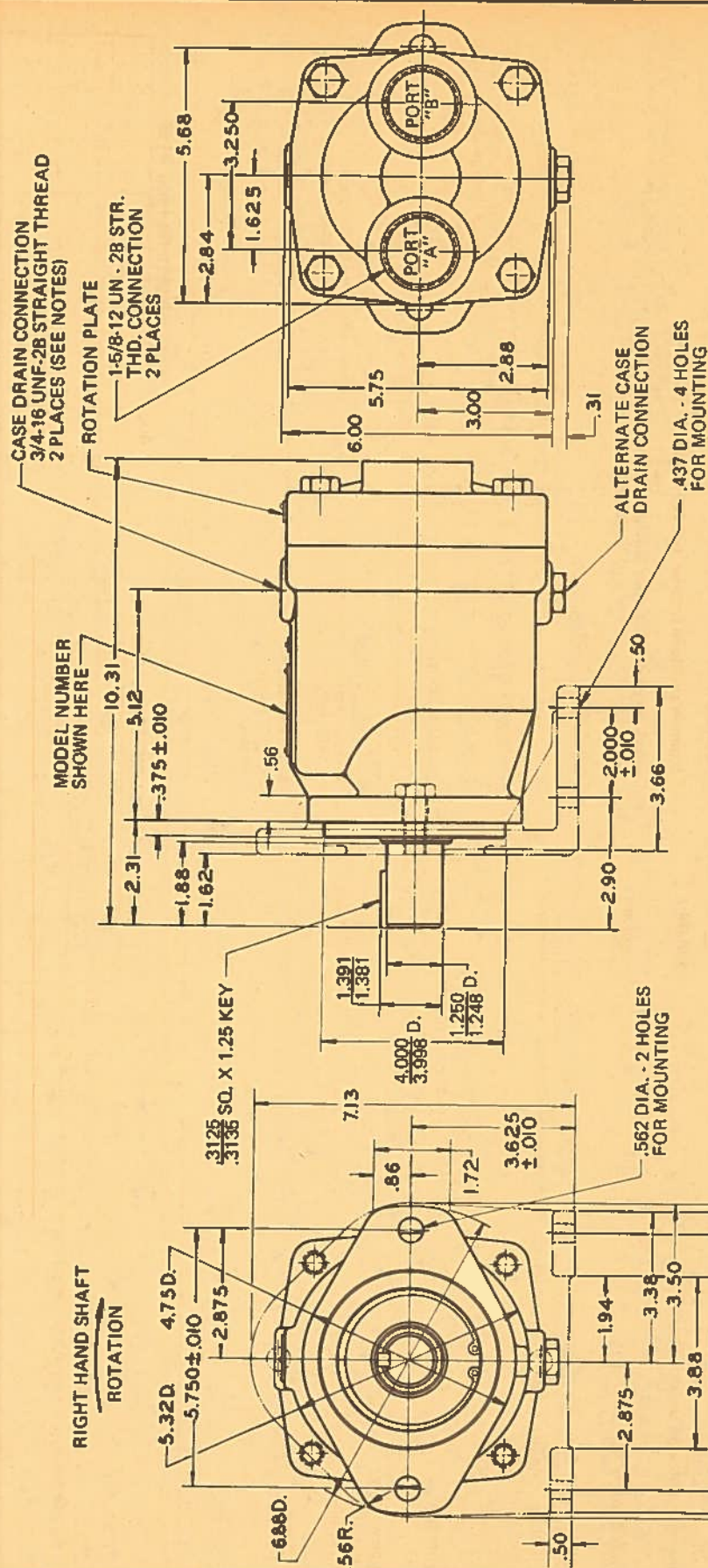
## MFB20 AND MFB29 FIXED DISPLACEMENT

**MFB20**  
**2400 RPM**  
**900 LB-IN**

**MFB29**  
**2400 RPM**  
**1040 LB-IN**

### FOOT OR FLANGE MOUNTING

DWG. NO.  
520310



SHAFT ROTATION	OUTLET PORT
R.H.	"A"
L.H.	"B"



# FIXED DISPLACEMENT, IN-LINE, PISTON MOTORS

MODEL SERIES MFB20 AND MFB29 10 DESIGN  
FLANGE OR FOOT MOUNTING

## GENERAL DATA

THESE MOTORS ARE OF THE AXIAL PISTON, CONSTANT DISPLACEMENT IN-LINE DESIGN. THEY CAN BE OPERATED IN EITHER DIRECTION OF ROTATION.

## OPERATING CHARACTERISTICS:

THE MOTORS ARE OF THE VARIABLE HORSEPOWER CLASS, HORSEPOWER OUTPUT BEING APPROXIMATELY PROPORTIONAL TO RPM WITH A GIVEN CONSTANT OPERATING PRESSURE. SERVICE MAY BE CONTINUOUS, INTERMITTENT, CONTINUOUS REVERSING, OR STALLED WITHOUT DAMAGE WHEN PROPERLY PROTECTED BY A RELIEF VALVE AND COOLING.

OUTPUT SPEEDS ARE DEPENDENT ON INPUT FLOW. SPEED RANGES OF AT LEAST 48:1 FOR THE MFB20 AND 30:1 FOR THE MFB29 ARE POSSIBLE AT MAXIMUM TORQUE RATING BY VARYING FLOW TO THE MOTOR.

## INSTALLATION

HORIZONTAL MOUNTING IS RECOMMENDED TO MAINTAIN NECESSARY CASE FLUID LEVEL. THE CASE DRAIN LINE MUST BE FULL SIZE UNRESTRICTED AND CONNECTED FROM THE UPPERMOST DRAIN PORT DIRECTLY TO THE RESERVOIR IN SUCH A MANNER THAT THE HOUSING REMAINS FILLED WITH FLUID. PIPING OF DRAIN LINE MUST PREVENT SIPHONING. PIPE DRAIN LINE SO THAT IT TERMINATES BELOW RESERVOIR FLUID LEVEL. NO OTHER LINES ARE TO BE CONNECTED TO THIS DRAIN LINE. CAUTION MUST BE EXERCISED TO NEVER EXCEED 5 PSI UNIT CASE PRESSURE.

## STARTING

BEFORE STARTING, FILL CASE WITH SYSTEM FLUID THRU UPPERMOST DRAIN PORT. HOUSING MUST BE KEPT FULL AT ALL TIMES TO PROVIDE INTERNAL LUBRICATION.

## SPECIFICATIONS

REFER TO DATA SHEET 1-286-S FOR HYDRAULIC FLUID AND TEMPERATURE RECOMMENDATIONS.

MODEL NO.	THEORETICAL DISPLACEMENT CU. IN./REV.	OPERATING SPEED RPM MAX.	PRESSURE* PSI MAX.
MFB-20	2.61	2400	2500
MFB-29	3.76	2400	2000

\*SUM OF INLET AND OUTLET PRESSURES

MINIMUM RECOMMENDED OPERATING SPEED (RPM). . . . . MFB20..... 50  
MFB29..... 80  
BREAK AWAY PRESSURE PSI (NO LOAD AVERAGE)..... 350

THEORETICAL OUTPUT TORQUE (LB. INS. PER 100 PSI DIFFERENTIAL PRESSURE). . . . . MFB-20..... 41.5  
MFB-29..... 59.8

## FILTRATION

RECOMMENDED..... 25 MICRON

WEIGHT LBS. (APPROX.)

FLANGE MTG..... 41

FOOT MTG..... 46

THESE UNITS ARE DESIGNED TO MEET SPECIFICATIONS AS OUTLINED. TO INSURE MAXIMUM UNIT PERFORMANCE IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION, CONSULT YOUR SPERRY VICKERS APPLICATION ENGINEER IF YOUR:

SPEED IS ABOVE 1800 RPM

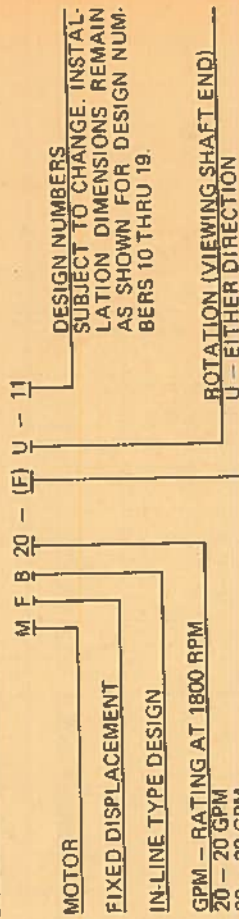
FLUID DOES NOT MEET THE SPECIFICATIONS SHOWN ON DATA SHEET 1-286-S

APPLICATION REQUIRES AN INDIRECT DRIVE

MOUNTING ATTITUDE IS OTHER THAN HORIZONTAL

NEEDS REQUIRE APPLICATION ASSISTANCE

## TYPICAL MODEL CODE



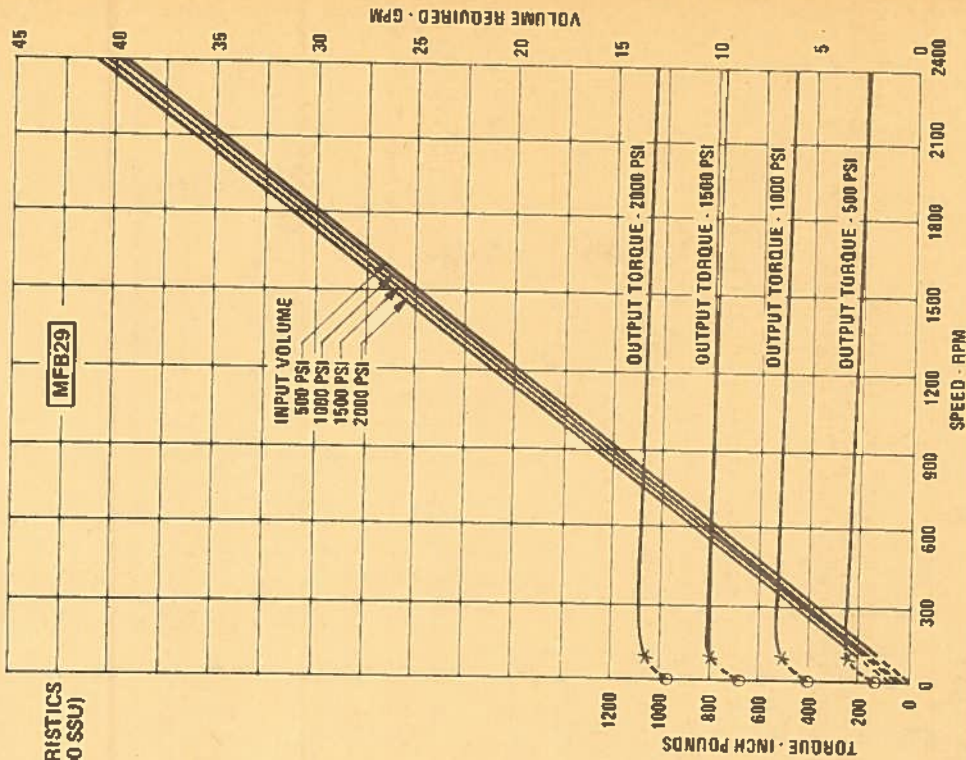
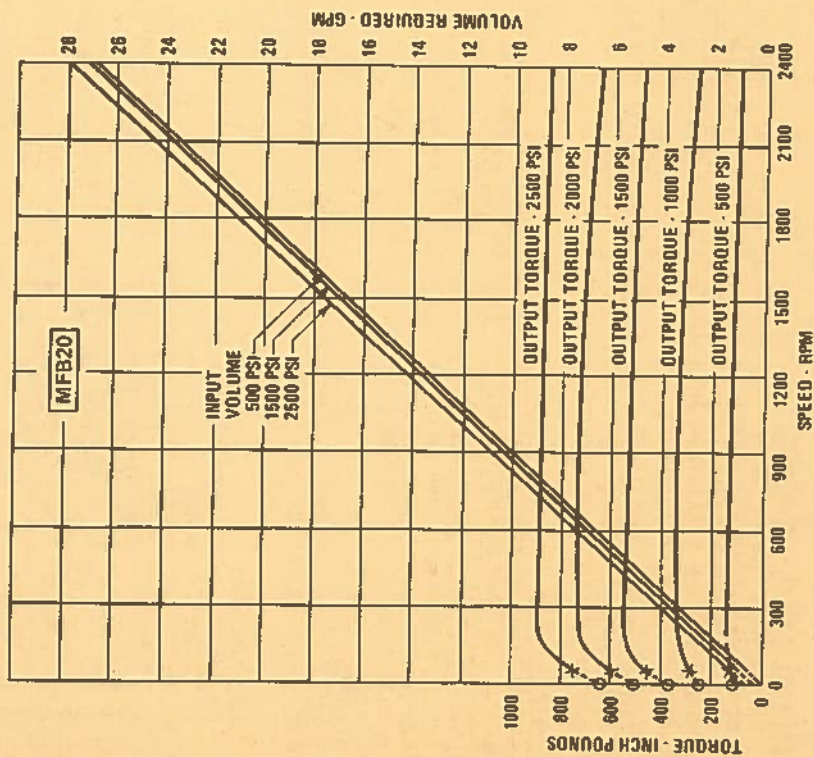


# FIXED DISPLACEMENT, IN-LINE, PISTON MOTORS

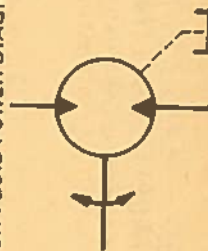
MODEL SERIES MFB20 AND MFB29-10 DESIGN  
FLANGE OR FOOT MOUNTING

TYPICAL PERFORMANCE CHARACTERISTICS  
BASED ON OIL TEMP. OF 120° F. (100 SSU)

- X INDICATES MINIMUM SPEED WITH APPROXIMATELY ± 10% SPEED VARIATION
- O INDICATES STALL TORQUE
- INDICATES ESTIMATED VALUES



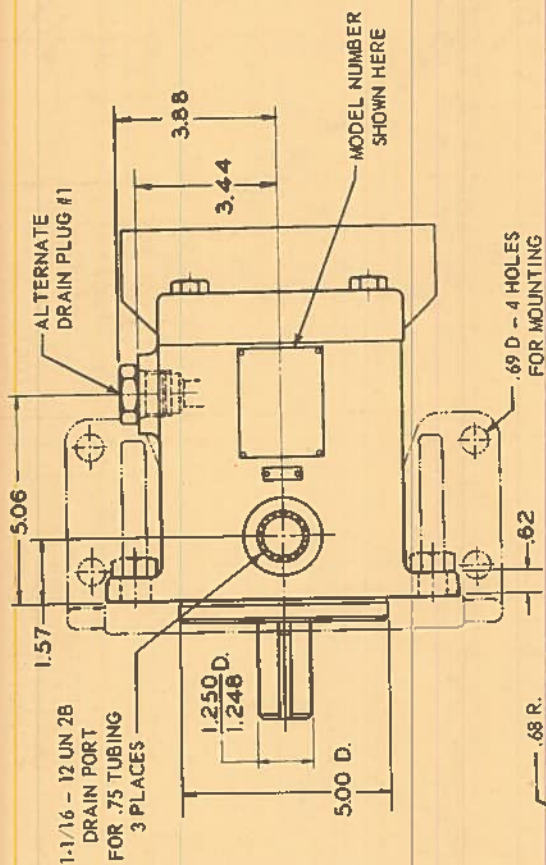
STANDARD GRAPHICAL SYMBOL  
FOR FLUID POWER DIAGRAMS





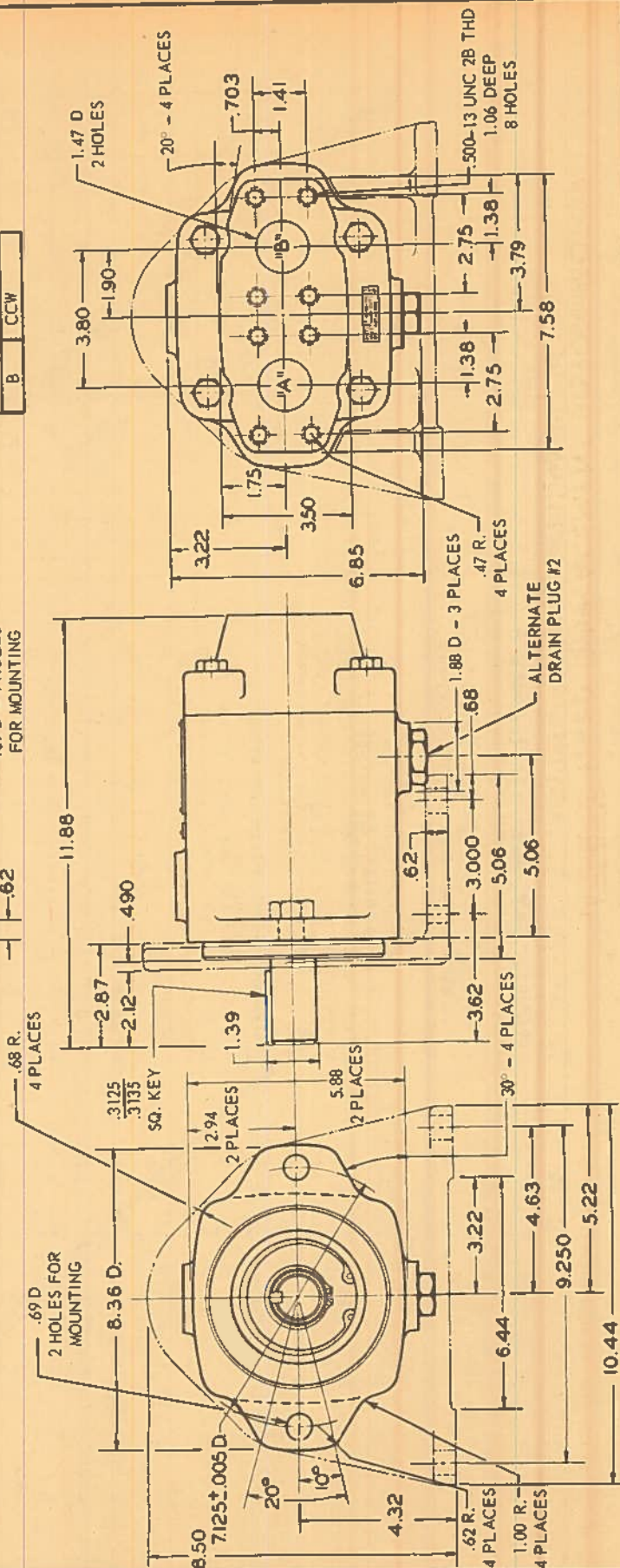
# VICKERS FIXED DISPLACEMENT PISTON MOTOR

MODEL SERIES MFB29-20 DESIGN (IN-LINE TYPE)  
FLANGE AND FOOT MOUNTING



ROTATION - VIEWED  
FROM SHAFT END

INLET	ROTATION
A	CW
B	CCW



VICKERS DIVISION  
SPERRY RAND CORPORATION  
TROY, MICHIGAN

PISTON MOTOR  
IN-LINE TYPE

FIXED  
DISPLACEMENT

2400 RPM  
1580 LB. IN

FLANGE OR FOOT  
BRACKET MOUNTED

DWG NO.  
520315



## GENERAL DATA

THIS MOTOR IS OF THE AXIAL PISTON, FIXED DIS-  
PLACEMENT, IN-LINE DESIGN. IT IS RATED AT 29 GPM  
1800 RPM AND 1500 PSI.

## OPERATING CHARACTERISTICS

UNIT IS OF THE VARIABLE HORSEPOWER CLASS.  
HORSEPOWER OUTPUT BEING APPROXIMATELY PRO-  
PORTIONAL TO RPM WITH A GIVEN CONSTANT OPERA-  
TING PRESSURE. SERVICE MAY BE CONTINUOUS,  
INTERMITTENT, CONTINUOUS REVERSING, OR STAL-  
LED WITHOUT DAMAGE WHEN PROPERLY PROTECTED  
BY RELIEF VALVE.

## OPERATING SPECIFICATIONS

THEORETICAL DISPLACEMENT... 3.76 CU. IN./REV.

## FLOW REQUIREMENT (NO LOAD)

AT RATED SPEED ..... 29 GPM  
AT MAXIMUM SPEED ..... 39 GPM

## OPERATING SPEED

RATED ..... 1800 RPM  
MAXIMUM ..... 2400 RPM  
MINIMUM SMOOTH RUNNING ..... 50 RPM

## OPERATING PRESSURE

RATED (ATMOSPHERIC OUTLET) ..... 1500 PSI  
MAXIMUM RECOMMENDED SUM OF  
INLET AND OUTLET PRESSURES ..... 3000 PSI

## OUTPUT TORQUE

RATED ..... 775 LB. IN.  
MAXIMUM ..... 1580 LB. IN.

## CASE PRESSURE

NOT TO EXCEED ..... 5 PSI

## DRIVE ROTATION

MOTORS WILL OPERATE IN EITHER A CLOCKWISE  
OR COUNTERCLOCKWISE DIRECTION BY REVERS-  
ING DIRECTIONS OF FLUID FLOW.

## INSTALLATION

THE ATTITUDE OF THE UNIT IS NOT LIMITED. A  
FULL SIZE UNRESTRICTED CASE DRAIN LINE  
MUST BE CONNECTED FROM THE UPPERMOST  
DRAIN PORT DIRECTLY TO THE RESERVOIR IN  
SUCH A MANNER THAT THE HOUSING REMAINS  
FILLED WITH FLUID. PIPING OF DRAIN LINE MUST  
PREVENT SIPHONING. DRAIN LINE MUST TERMI-  
NATE BELOW RESERVOIR FLUID LEVEL.

## FILTRATION

PRESSURE OR RETURN LINE ..... 25 MICRON

## STARTING

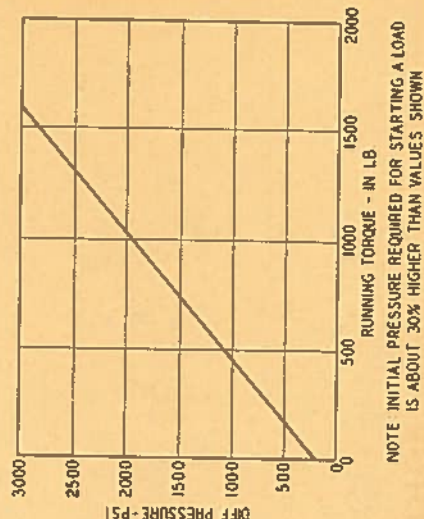
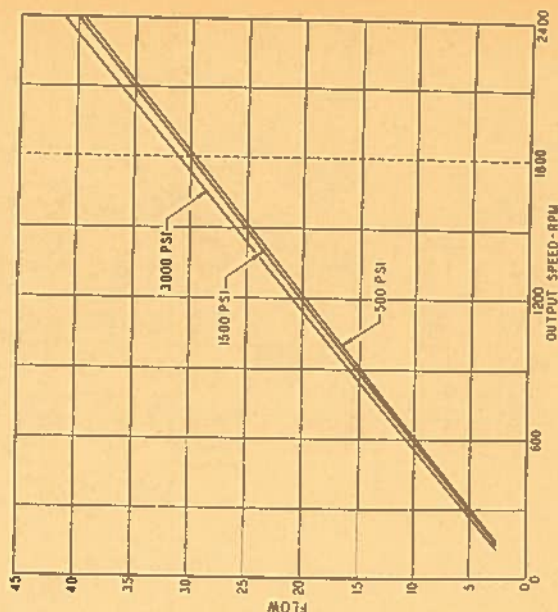
BEFORE STARTING, FILL THE CASE WITH SYSTEM  
FLUID THRU THE UPPERMOST DRAIN PORT. THE  
HOUSING MUST BE KEPT FULL AT ALL TIMES TO  
PROVIDE INTERNAL LUBRICATION.

VICKERS

# VICKERS FIXED DISPLACEMENT PISTON MOTOR

MODEL SERIES MFB29-20 DESIGN (IN-LINE TYPE)

## PERFORMANCE CHARACTERISTICS BASED ON OIL TEMPERATURE OF 120° F. (100 SSU) AND ATMOSPHERIC OUTLET



NOTE: INITIAL PRESSURE REQUIRED FOR STARTING A LOAD  
IS ABOUT 30% HIGHER THAN VALUES SHOWN

THIS UNIT IS DESIGNED TO MEET SPECIFICATIONS AS  
OUTLINED. TO INSURE MAXIMUM UNIT PERFORMANCE, IN  
CONJUNCTION WITH YOUR SPECIFIC APPLICATION, CON-  
SULT YOUR VICKERS APPLICATION ENGINEER IF YOUR:  
PRESSURE REQUIREMENTS ARE ABOVE RATED PRES-  
SURE OF 1500 PSI.

SPEED IS ABOVE 1800 RPM RATING.

SPEED IS BELOW MINIMUM RECOMMENDED SPEED OF  
50 RPM. MINIMUM SPEED VARIES WITH CONDITIONS.  
DEPENDENT ON APPLICATION AND CIRCUIT CONSID-  
ERATION, LOWER MOTOR SPEEDS ARE OBTAINABLE  
MAINTAINING  $\pm 10\%$  SPEED VARIATION.

SYSTEM REQUIRES FIRE RESISTANT FLUID.

OPERATING TEMPERATURE IS NOT WITHIN 100° TO  
150° F. WITH PROPER APPLICATION AND FLUID CON-  
SIDERATION, A GREATER TEMPERATURE RANGE IS  
PERMISSIBLE.

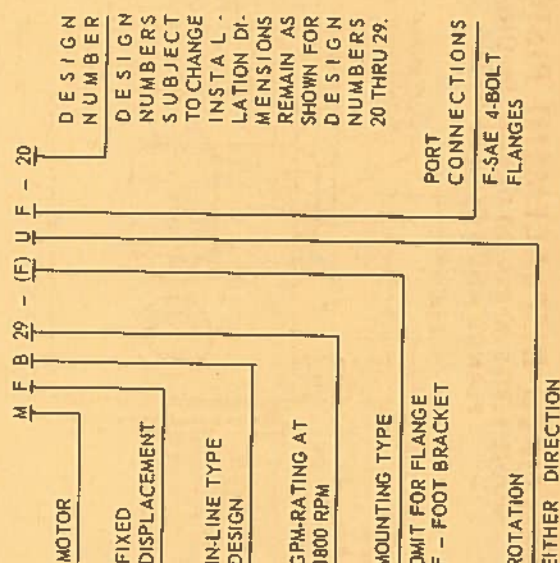
OIL VISCOSITY AT OPERATING CONDITIONS IS NOT  
WITHIN 100 TO 250 SSU.

APPLICATION REQUIRES AN INDIRECT DRIVE.

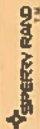
OIL VISCOSITY AT START-UP IS IN EXCESS OF 1000  
SSU.

NEEDS REQUIRE APPLICATION ASSISTANCE.

## TYPICAL MODEL CODE







# **VICKERS® FIXED DISPLACEMENT IN-LINE, PISTON MOTORS**

MODEL SERIES MFB45-UF-10  
FLANGE OR FOOT MOUNTING

VICKERS DIVISION  
OF SPERRY RAND CORPORATION  
TROY, MICHIGAN 48064

PISTON MOTOR  
INLINE TYPE

FIXED  
DISPLACEMENT

2200 RPM  
2400 LB. IN.

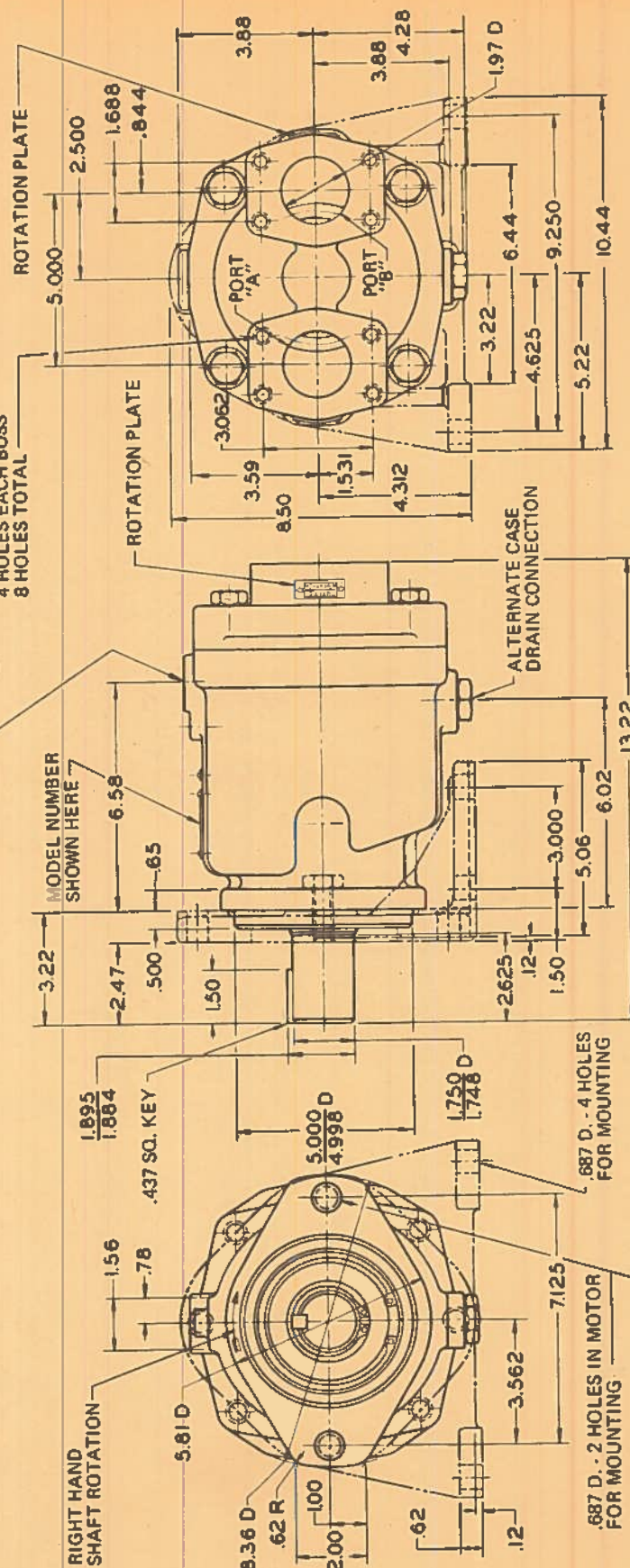
FLANGE OR  
FOOT BRACKET  
MOUNTING

DWG. NO.  
520325

MODEL NUMBER	SHAFT ROTATION	OUTLET PORT
MFB45-UF-10	R.H.	"A"
MFB45-UF-10	L.H.	"B"

CASE DRAIN CONNECTION  
1.0625-12 UN - 28 THD.  
SAE "O" RING BOSS CONNECTION  
FOR 3/4 O.D. TUBING  
2 PLACES

.500-13 UNC - 28 THD. - 1.06 DEEP  
4 HOLES EACH BOSS  
8 HOLES TOTAL





## GENERAL DATA

THESE MOTORS ARE OF THE AXIAL PISTON, FIXED DISPLACEMENT INLINE DESIGN. THEY CAN BE OPERATED IN EITHER DIRECTION OF ROTATION.

## OPERATING CHARACTERISTICS:

THE MOTORS ARE OF THE VARIABLE HORSEPOWER CLASS, HORSEPOWER OUTPUT BEING APPROXIMATELY PROPORTIONAL TO RPM WITH A GIVEN CONSTANT OPERATING PRESSURE. SERVICE MAY BE CONTINUOUS, INTERMITTENT, CONTINUOUS REVERSING, OR STALLED WITHOUT DAMAGE WHEN PROPERLY PROTECTED BY A RELIEF VALVE AND COOLING.

## INSTALLATION

HORIZONTAL MOUNTING IS RECOMMENDED TO MAINTAIN NECESSARY CASE FLUID LEVEL. THE CASE DRAIN LINE MUST BE FULL SIZE UNRESTRICTED AND CONNECTED FROM THE UPPERMOST DRAIN PORT DIRECTLY TO THE RESERVOIR IN SUCH A MANNER THAT THE HOUSING REMAINS FILLED WITH FLUID. PIPING OF DRAIN LINE MUST PREVENT SIPHONING. PIPE DRAIN LINE SO THAT IT TERMINATES BELOW RESERVOIR FLUID LEVEL. NO OTHER LINES ARE TO BE CONNECTED TO THIS DRAIN LINE. CAUTION MUST BE EXERCISED TO NEVER EXCEED 5 PSI UNIT CASE PRESSURE.

## FILTRATION

RECOMMENDED (PRESSURE OR RETURN LINE)..... 25 MICRON

## FLUIDS

REFER TO DATA SHEET 1-286-S (SECTION L) FOR HYDRAULIC OIL RECOMMENDATIONS.

## STARTING

BEFORE STARTING, FILL CASE WITH SYSTEM FLUID THRU UPPERMOST DRAIN PORT. HOUSING MUST BE KEPT FULL AT ALL TIMES TO PROVIDE INTERNAL LUBRICATION.

## SPECIFICATIONS

THEORETICAL DISPLACEMENT CU. IN./REV..... 5.76  
 OPERATING SPEED RPM..... { MAXIMUM 2200  
 MINIMUM 100  
 PRESSURE PSI..... MAXIMUM (SUM OF INLET AND OUTLET) 3000  
 BREAK AWAY PRESSURE PSI (NO LOAD)..... 165  
 FLOW REQUIREMENT GPM (NO LOAD) @ RATED SPEED..... 45  
 THEORETICAL OUTPUT TORQUE (LB. IN./100 PSI DIFFERENTIAL PRESSURE)..... 92  
 ACTUAL RUNNING TORQUE - APPROXIMATELY 85% OF THE THEORETICAL OUTPUT TORQUE AT 1500 PSI DIFFERENTIAL PRESSURE.  
 STALLED TORQUE - APPROXIMATELY 80% OF THE THEORETICAL OUTPUT TORQUE AT 1500 PSI DIFFERENTIAL PRESSURE.

WEIGHT LBS. (APPROX.)

FLANGE MOUNTING..... 73  
 FOOT MOUNTING..... 87

THESE UNITS ARE DESIGNED TO MEET SPECIFICATIONS AS OUTLINED. TO INSURE MAXIMUM UNIT PERFORMANCE, IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION, CONSULT YOUR VICKERS APPLICATION ENGINEER IF YOUR:

FLUID DOES NOT MEET THE SPECIFICATIONS SHOWN ON DATA SHEET 1-286-S  
 APPLICATION REQUIRES AN INDIRECT DRIVE  
 MOUNTING ATTITUDE IS OTHER THAN HORIZONTAL  
 NEEDS REQUIRE APPLICATION ASSISTANCE

## MODEL CODE

MFB 45 - (F) U F - 10

## MOTOR

## FIXED DISPLACEMENT

## INLINE TYPE DESIGN

GPM - RATING AT 1800 RPM

FOOT BRACKET MOUNTING  
 (OMIT WHEN NOT INCLUDED)

## DESIGN NUMBER

SUBJECT TO CHANGE. INSTALLATION DIMENSIONS REMAIN AS SHOWN FOR DESIGN NUMBERS 10 THRU 19.

SAE 4-BOLT FLANGE PORTS

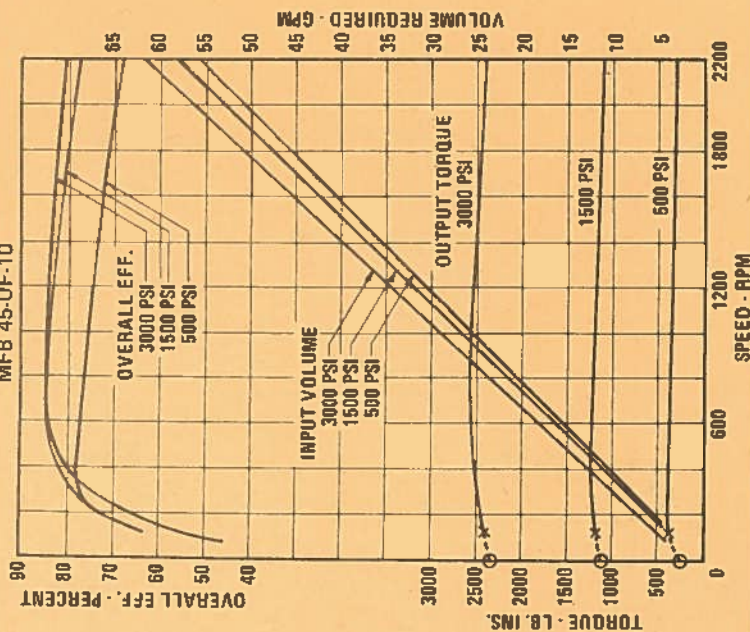
ROTATION (VIEWING SHAFT END)  
 U - EITHER DIRECTION

## PERFORMANCE CHARACTERISTICS

BASED ON OIL TEMP. OF 120° F. (100 SSU)

X INDICATES MINIMUM SPEED WITH APPROXIMATELY ±10% SPEED VARIATION  
 O INDICATES STALL TORQUE --- INDICATES ESTIMATED VALUE.

MFB 45-UF-10



STANDARD GRAPHICAL SYMBOL  
 FOR FLUID POWER DIAGRAMS





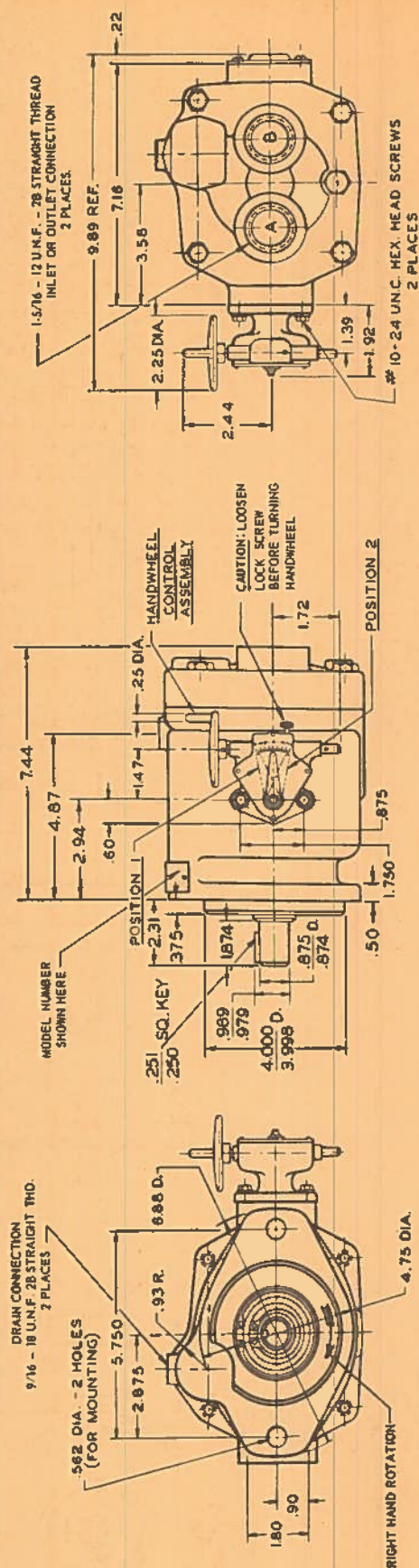








# **VICKERS® VARIABLE DISPLACEMENT PISTON MOTORS** **MVB10 (IN-LINE TYPE)** **WITH HANDWHEEL AND LEVER CONTROLS**

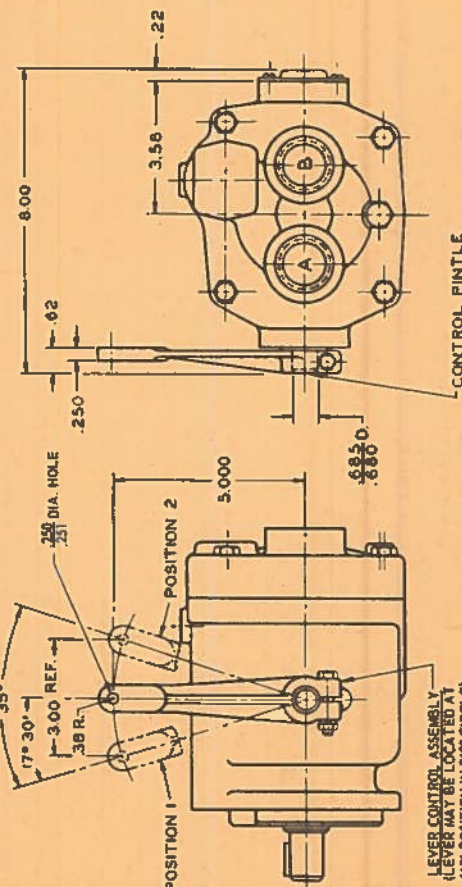


**HANDWHEEL CONTROL**  
 PROVIDES MANUAL SELECTION OF MOTOR DISPLACEMENT. HANDWHEEL CONTROLLED UNITS MAY BE OPERATED ON EITHER SIDE OF CENTER PERMITTING BI-DIRECTIONAL OUTPUT ROTATION.

SHAFT ROTATION	POINTER POSITION	HANDWHEEL ROTATION FROM ZERO	INLET PORT
R.H.	1	CLOCKWISE	B
R.H.	2	COUNTER CLOCKWISE	A
L.H.	1	CLOCKWISE	A
L.H.	2	COUNTER CLOCKWISE	B

**LEVER CONTROL**  
 PROVIDES MECHANICAL OR MANUAL SELECTION OF MOTOR DISPLACEMENT. LEVER CONTROLLED UNITS MAY BE OPERATED ON EITHER SIDE OF CENTER PERMITTING BI-DIRECTIONAL OUTPUT ROTATION. CHARACTERISTICS, LEVER CONTROL MUST BE SECURED BY SUITABLE LINKAGE ARRANGEMENT TO MAINTAIN DESIRED SETTING. THE CONTROL PINTLE MAY BE ROTATED 17-1/2° ON EACH SIDE OF CENTER POSITION TO PERMIT FULL REVERSAL OF OUTPUT SHAFT. PINTLE TRAVEL IS LIMITED TO 35° BY INTERNAL STOPS. TORQUE REQUIRED TO ROTATE CONTROL PINTLE IS APPROXIMATELY 40 IN. LBS. AT RATED SPEED AND PRESSURE.

SHAFT ROTATION	LEVER POSITION	INLET PORT
R.H.	1	B
R.H.	2	A
L.H.	1	A
L.H.	2	B



**CAUTION**  
 EXCESSIVE OUTPUT SPEED WILL OCCUR IF HANDWHEEL OR LEVER CONTROLS ARE USED TO (1) POSITION YOKES TOO NEAR THE ZERO POSITION, OR (2) STROKE YOKES ACROSS CENTER (THRU ZERO) WHILE PUMP IS DRIVING FLUID MOTOR.

**STARTING**  
 BEFORE STARTING, FILL CASE WITH SYSTEM FLUID THRU UPPERMOST DRAIN PORT. HOUSING MUST BE KEPT FULL AT ALL TIMES TO PROVIDE INTERNAL LUBRICATION. CASE PRESSURE SHOULD NOT EXCEED 5 P.S.I.

**INSTALLATION**  
 ATTITUDE OF THE UNIT IS NOT LIMITED. A FULL SIZE UNRESTRICTED CASE DRAIN LINE MUST BE CONNECTED FROM THE UPPERMOST DRAIN PORT DIRECTLY TO RESERVOIR IN SUCH A MANNER THAT THE HOUSING REMAINS FILLED WITH FLUID. PIPING OF DRAIN LINE MUST PREVENT SIPHONING. DRAIN LINE MUST TERMINATE BELOW RESERVOIR FLUID LEVEL.

**VICKERS INCORPORATED**  
 DIVISION OF SPERRY CORPORATION  
 SPERRY, WARREN, N.Y.

**INSTALLATION DRAWING**

**I-273838**

THIS DRAWING RELEASED 12-16-63 P.W.2  
 CHECKED 12-16-63 T.B.  
 DRAWN 12-16-63 T.B.

PISTON MOTOR | MVB10 VARIABLE | 3200 RPM | HANDWHEEL & | FLANGE & FOOT | INST. DRWG.  
 IN-LINE TYPE | DISPLACEMENT | 540 LB. IN. TORQUE | LEVER CONTROLS | MOUNTING | I-273838



# VICKERS® VARIABLE DISPLACEMENT PISTON MOTORS WITH HANDWHEEL AND LEVER CONTROLS

## GENERAL DATA

THESE MOTORS ARE OF THE AXIAL PISTON, VARIABLE DISPLACEMENT IN-LINE DESIGN AND PROVIDE POWER FOR A WIDE RANGE OF INDUSTRIAL APPLICATIONS.

## OPERATING CHARACTERISTICS

HORSEPOWER OUTPUT IS APPROXIMATELY PROPORTIONAL TO RPM WITH A GIVEN CONSTANT OPERATING PRESSURE AND CONTROL SETTING. SERVICE MAY BE CONTINUOUS, INTERMITTENT, REVERSING OR STALLED WITHOUT DAMAGE WHEN PROPERLY PROTECTED BY RELIEF VALVE.

CAUTION: DIRECTION OF SHAFT ROTATION TO BE OBTAINED BY REVERSING FLOW TO THE MOTOR ONLY AND NOT BY REVERSING MOTOR CONTROL.

OUTPUT SPEEDS ARE DEPENDENT ON INPUT FLOW AND POSITION OF MOTOR CONTROL. SPEED RANGES OF 1:1 (300-3200) AND HIGHER ARE POSSIBLE WITH OUTPUT TORQUES TO 540 LB.-IN. BY VARYING FLOW TO THE MOTOR, WITH CONSTANT FLOW TO THE MOTOR, A SPEED RANGE OF 4:1 IS POSSIBLE BY VARYING MOTOR DISPLACEMENT.

## OPERATING SPECIFICATIONS

THEORETICAL MAXIMUM DISPLACEMENT ..... 1.29 CU. IN./REV.

FLOWS ..... 10.0 GPM FOR RATED SPEED  
18.0 GPM FOR MAX. SPEED

## OPERATING PRESSURE

\*RATED ..... 1500 PSI

MAXIMUM (SUM OF INLET AND OUTLET PRESSURE) ..... 3000 PSI

## OPERATING SPEED

\*RATED ..... 1800 RPM

MAXIMUM ..... 3200 RPM

## OUTPUT TORQUE

AT RATED PRESSURE ..... 270 LB. IN.

AT MAXIMUM PRESSURE ..... 540 LB. IN.

\*RATINGS BASED ON CALCULATED 10,000 HOURS B-10 BEARING LIFE.

## RECOMMENDED MINIMUM OPERATING SPEED

..... 300 RPM

MOTOR SPEEDS DOWN TO 50 RPM ARE POSSIBLE WITH APPROPRIATE CIRCUIT AND APPLICATION CONSIDERATIONS.

## CASE PRESSURE

..... 5 PSI MAX.

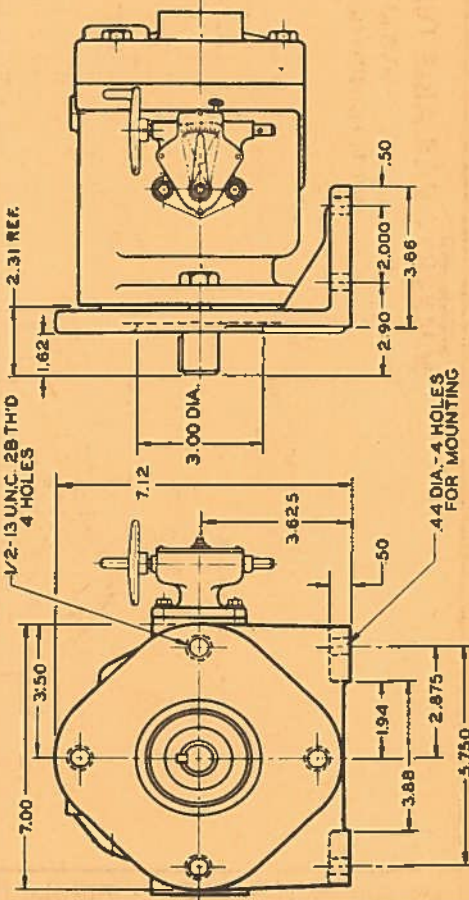
## WEIGHT (DRY)

..... APPROX. 31 LBS.

## WITH FOOT MOUNT.

..... APPROX. 36 LBS.

## FOOT MOUNTING-ALL MODELS



## DRIVE ROTATION

MOTORS WILL OPERATE IN EITHER A CLOCKWISE OR COUNTERCLOCKWISE DIRECTION BY REVERSING DIRECTION OF FLUID FLOW.

## FILTRATION

..... 25 MICRONS

## FLUID

CLEAN PETROLEUM OIL MEETING OR EXCEEDING LUBRICATING QUALITIES OF SAE 10W MEETING API SERVICE CLASSIFICATION MS (MAXIMUM SEVERITY) IS RECOMMENDED. VISCOSITY RANGE 150-25 SSU AT 100°F.

THIS UNIT IS DESIGNED TO MEET SPECIFICATIONS AS OUTLINED. TO INSURE MAXIMUM UNIT PERFORMANCE, IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION, CONSULT YOUR VICKERS APPLICATION ENGINEER IF YOUR:

PRESSURE REQUIREMENTS ARE ABOVE RATED PRESSURE OF 1500 PSI

SPEED IS ABOVE 1800 RPM RATING

SYSTEM REQUIRES MOTOR SPEED BELOW 300 RPM

SYSTEM REQUIRES FIRE RESISTANT FLUID

OPERATING TEMPERATURE IS NOT WITHIN 100° F. TO 150° F. WITH PROPER APPLICATION AND FLUID CONSIDERATION, A GREATER TEMPERATURE RANGE IS PERMISSIBLE

OIL VISCOSITY AT OPERATING TEMPERATURE IS NOT WITHIN 100 TO 250 SSU

OIL VISCOSITY AT START-UP IS IN EXCESS OF 1000 SSU

APPLICATION REQUIRES AN INDIRECT DRIVE

NEEDS REQUIRE APPLICATION ASSISTANCE

## TYPICAL MODEL CODE

M V B 10 - (F) U D Y - 20 - H (L) - 10

TYPE  
M - MOTOR

VARIABLE DISPLACEMENT

IN-LINE TYPE DESIGN

GPM - RATING AT 1800 RPM

FOOT BRACKET MOUNTING  
(OMIT WHEN NOT INCLUDED)

ROTATION (VIEWING SHAFT END)  
U - EITHER DIRECTION

DISPLACEMENT  
D - BOTH SIDES OF CENTER

SHAFT TYPE

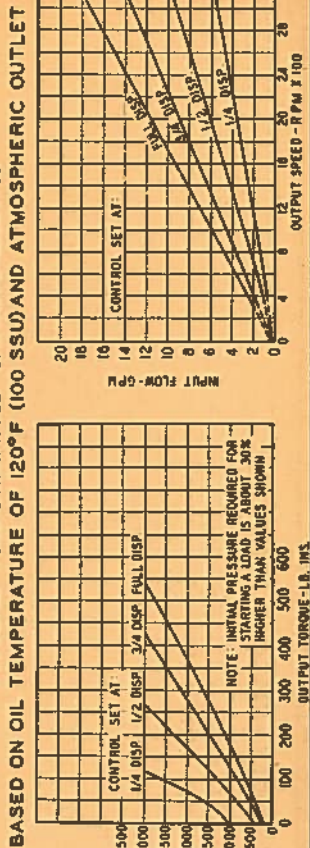
CONTROL DESIGN NO.  
DESIGN NUMBERS SUBJECT TO CHANGE. INSTALLATION DIMENSIONS REMAIN AS SHOWN FOR DESIGN NUMBERS 10 THRU 19.

CONTROL POSITION  
L - L.H. SIDE - VIEWING SHAFT END  
(OMIT FOR STD. R.H. LOCATION)

CONTROL TYPE  
H - HANDWHEEL  
M - LEVER

MOTOR DESIGN NUMBER  
DESIGN NUMBERS SUBJECT TO CHANGE. INSTALLATION DIMENSIONS REMAIN AS SHOWN FOR DESIGN NUMBERS 20 THRU 29.

## TYPICAL PERFORMANCE CHARACTERISTICS





# **VICKERS** CONSTANT DISPLACEMENT PISTON TYPE FLUID MOTORS

## THREADED CONNECTIONS

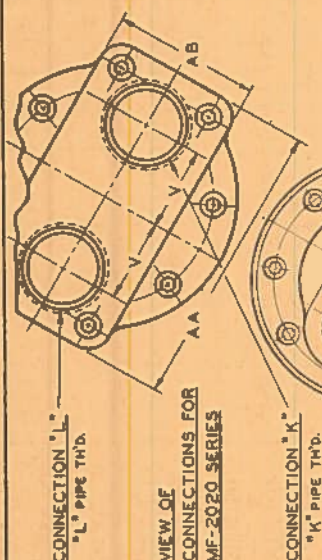
MODEL NUMBERS INDICATE PISTON TYPE MOTORS OF CONSTANT DISPLACEMENT, THE OPERATING PRESSURE AND CAPACITY, HOUSING ANGLE, TORQUE, DESIGN AND MODIFICATION NUMBER.

THEORETICAL TORQUE IS INDICATED IN THE TABULATION AND IS THE TORQUE DEVELOPED FOR EACH X OPERATING PRESSURE. TOTAL THEORETICAL TORQUE RATING X OPERATING PRESSURE IS APPROXIMATELY 85% OF THE TOTAL THEORETICAL TORQUE RATING. ACTUAL TORQUE IS APPROXIMATELY 85% OF THE TOTAL THEORETICAL TORQUE RATING. ACTUAL OPERATING PRESSURE (FOR AVERAGE RECOMMENDED OPERATING SPEEDS AND PRESSURES) STALLED TORQUE IS ABOUT 85% OF THE ACTUAL RUNNING TORQUE.

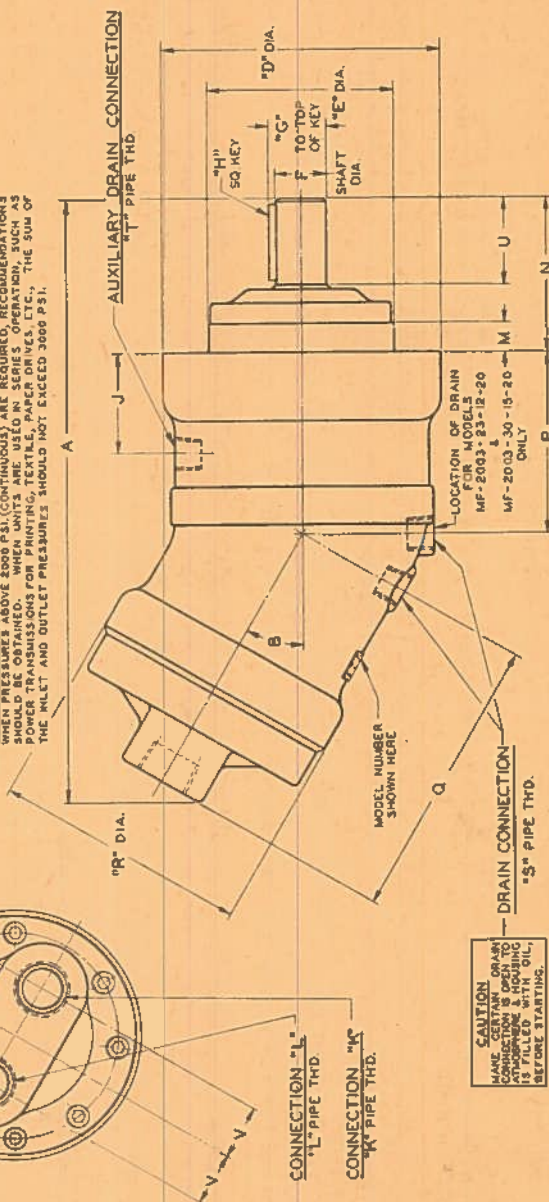
RECOMMENDED MAXIMUM SPEED AS INDICATED IN TABULATION IS MAXIMUM RPM FOR NORMAL OPERATING CONDITIONS. WHERE INSTALLATIONS REQUIRE DRIVE SPEEDS EXCEEDING MAXIMUM SHOWN, VICKERS RECOMMENDATIONS SHOULD BE OBTAINED. RECOMMENDED MINIMUM SPEED VARIES WITH CONDITIONS. RECOMMENDATIONS SHOULD BE OBTAINED FOR A GIVEN APPLICATION AND SIZE OF UNIT WHEN LESS THAN 60 RPM MAXIMUM OPERATING PRESSURES. WHEN PRESSURES ABOVE 3000 PSI (CONTINUOUS) ARE REQUIRED, RECOMMENDATIONS SHOULD BE OBTAINED. RECOMMENDATIONS SHOULD BE OBTAINED FOR SUCH POWER TRANSMISSIONS FOR PAINTING, TEXTILE, PAPER DRIVES, ETC. THE SUM OF THE INLET AND OUTLET PRESSURES SHOULD NOT EXCEED 3000 PSI.

DISPLACEMENT TABULATED IS AT ZERO INLET PRESSURE. VOLUMETRIC EFFICIENCIES VARY BETWEEN 87% AND 92% AT AVERAGE RECOMMENDED SPEEDS AND PRESSURES.

SERVICE MAY BE CONTINUOUS, INTERMITTENT, CONTINUOUS, REVERSING OR STALLED WITHOUT DAMAGE WHEN PROPERLY PROTECTED BY RELIEF VALVE. OPERATING CHARACTERISTICS ARE OF THE VARIABLE DISPLACEMENT CLASS, H.P. CAPACITY IS PROPORTIONATELY PROPORTIONAL TO RPM WITH A GIVEN CONSTANT OPERATING PRESSURE. OVERALL EFFICIENCY IS DEPENDENT UPON OPERATING PRESSURE, SPEED AND SIZE OF UNIT. APPROXIMATE AVERAGE 80% TO 85% FOR AMBIENT TEMPERATURES FROM 50° F. TO 120° F. IS RECOMMENDED. RECOMMENDED OPERATING TEMPERATURE IS 120° F. REFER TO DATA SHEET 244-3 FOR RECOMMENDED HYDRAULIC OIL SPECIFICATIONS.



VIEW OF CONNECTIONS FOR MF-2020 SERIES



**CAUTION**  
DO NOT OPERATE MOTOR WITH INLET OR OUTLET CONNECTIONS OPEN TO ATMOSPHERE OR HOUSING FILLER CAP REMOVED BEFORE STARTING.

KEEP HOUSING FILLED AT ALL TIMES AND PREVENT SYNCHRONIZING ACTION. PISTON PUMPS OR MOTORS DEPEND ON THE OILING OIL FOR LUBRICATION OF INTERNAL PARTS.

DIRECTION OF SHAFT ROTATION  
WHEN CONNECTION "L" IS INLET  
SHAFT ROTATES IN DIRECTION OF ARROW  
WHEN CONNECTION "K" IS INLET  
SHAFT ROTATES IN DIRECTION OPPOSITE TO ARROW  
(FOUR-WAY VALVE ACTION MAY BE USED IN CONTINUOUS, C-MOUNT WHEN REVERSING ACTION IS REQUIRED)

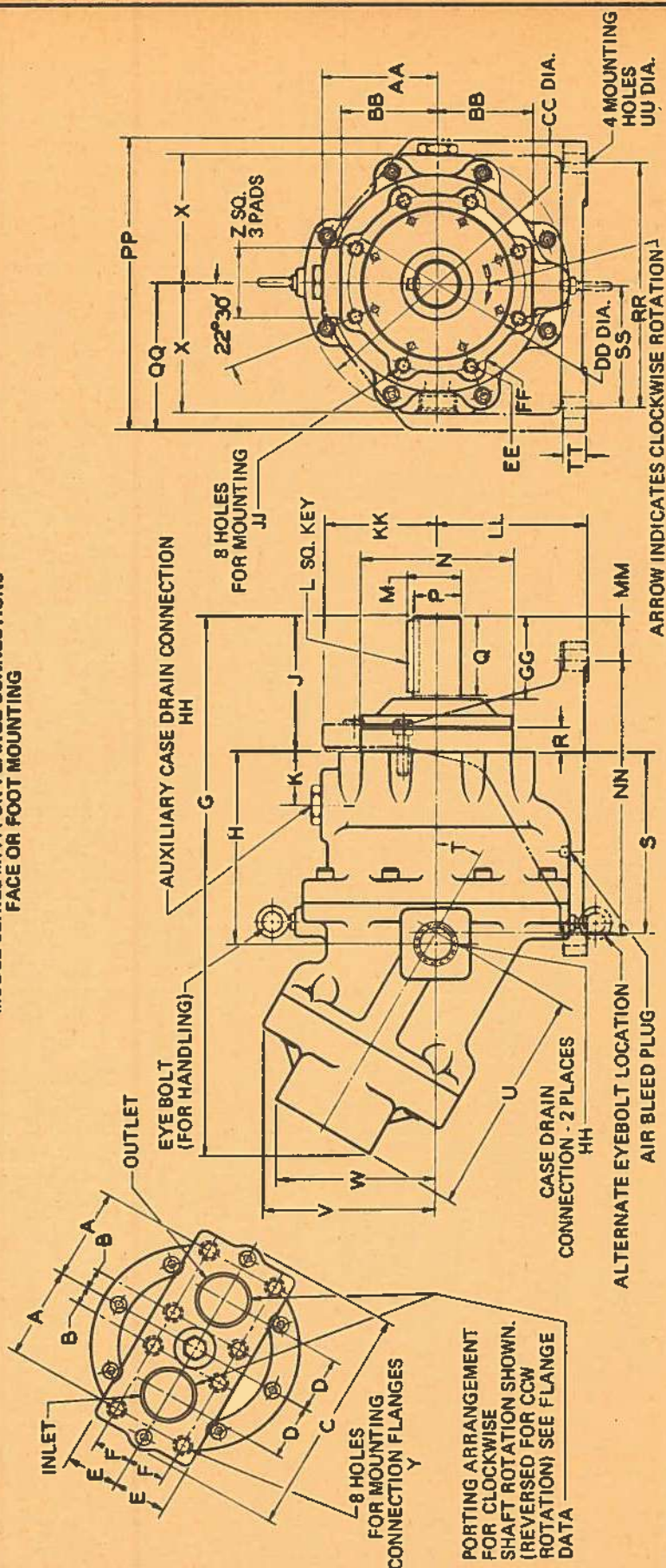
MODEL NUMBER	MAXIMUM R.P.M.	DISPLACEMENT CU. IN. / REV.	TORQUE LB. IN. / 100 PSI	A	B	C	D	E	F	G	H	I	J	K	L	M	N	P	Q	R	S	T	U	V	W	X	AA	AB	WT. APPROX.
MF-2003-23-12-20	3600	.76	12	9 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	20	
MF-2003-30-15-20	3600	.86	15	9 1/2	3 0	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	20	
MF-2008-23-30-20	2800	1.92	30	12 1/2	2 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	30	
MF-2008-30-38-20	2200	2.41	38	12 1/2	3 0	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	30	
MF-2012-23-48-20	2400	3.05	48	15 1/2	2 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	50	
MF-2012-30-61-20	1800	3.82	61	15 1/2	3 0	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	50	
MF-2020-23-78-20	2000	4.77	78	15 1/2	2 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	75	
MF-2020-30-95-20	1600	5.88	95	15 1/2	3 0	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	75	

EXAMPLE OF MODEL NUMBER  
MODEL MF-2012-30-61-20  
DESIGN NUMBERS SUBJECT TO CHANGE  
INSTALLATION DIMENSIONS REMAIN AS SHOWN FOR DESIGN NUMBERS 10 THRU 18 AND 20 THRU 28.

REVISED 4-1-89 W.H.S.  
Vickers Inc.  
INSTALLATION DRAWING  
I.136014



**VICKERS®. FIXED DISPLACEMENT ANGLE-TYPE PISTON MOTORS**  
MODEL SERIES MFA FOR FLANGE CONNECTIONS  
FACE OR FOOT MOUNTING



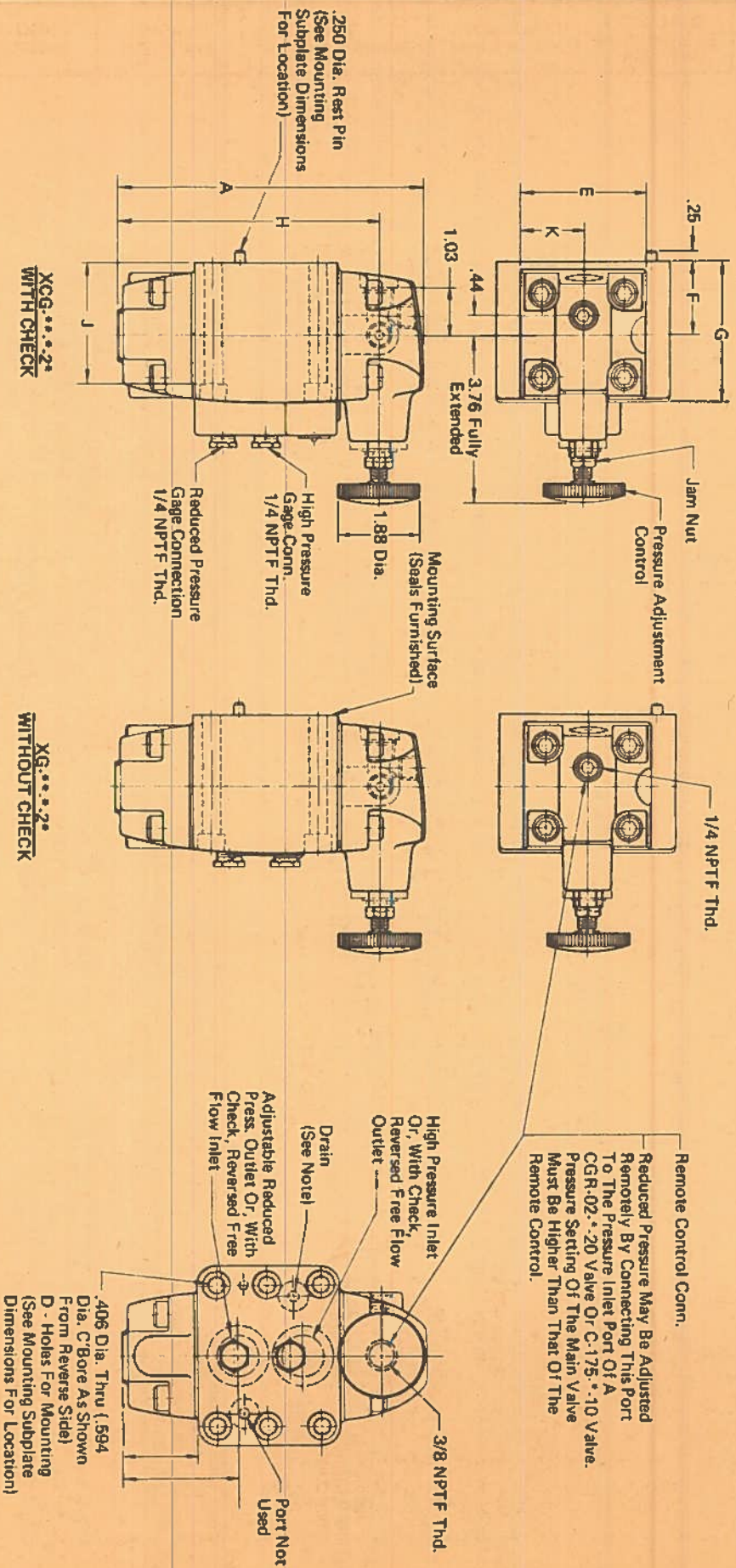
REVISÉ 6-1-72

MODEL SERIES	A	B	C	D	E	F	G	H	J	K	L	M	N DIA.	P DIA.	Q	R	S	T	U	V	W	X	Y
MFA50-23	4.000	.750	9.50	2.375	2.38	1.625	22.72	8.00	5.69	2.12	.375	<u>1.922</u> 1.912	<u>6.499</u> 6.495	<u>1.7495</u> 1.7490	2.69	1.125	7.31	23°30'	9.19	6.00	5.88	5.88	.625-11 UNC-2B THD. 1.25 DEEP
MFA50-30							22.12											30°		6.62	6.66		
MFA120-23							28.62											23°30'		8.53	7.00		.875-9
MFA120-30 & MFA150-30	4.750	1.000	12.12	2.875	2.81	1.875	28.12	10.06	7.06	2.81	.625	<u>2.779</u> 2.769	<u>7.999</u> 7.995	<u>2.4995</u> 2.4890	4.12	1.312	9.44	30°	11.75	9.14	8.38	6.62	UNC-2B THD. 1.25 DEEP
MODEL SERIES	Z	AA	BB	CC DIA.	DD DIA.	EE RAD.	FF RAD.	GG	HH	JJ	KK	LL	MM	NN	PP	QQ	RR	SS	TT	UU			
MFA50-23	3.25	5.00	4.20	11.75	7.750	.62	1.00	2.86	1.312-12 UN-2B THD. (FOR 1" O.D. TUBING)	.500-13 UNC-2B THD. 1.12 DEEP	4.75	<u>7.750</u> ± .005	1.44	11.500	11.50	5.75	9.875	4.938	1.06	.78			
MFA50-30																							
MFA120-23 & MFA150-30	3.75	6.00	5.12	13.88	9.375	.75	.75	4.25	1.875-12 UN-2B THD. (FOR 1-1/2" O.D. TUBING)	.750-10 UNC-2B THD. 1.50 DEEP	6.00	<u>8.000</u> ± .005	2.31	14.250	15.00	7.50	13.000	6.500	1.44	1.06	520500		

SE



# MANIFOLD OR SUBPLATE MOUNTING



Valve Model Number	Dimensions											Wt. Lbs.	
	A	B	C	D	E	F	G		H	J	K	Without Check Valve	With Check Valve
							XG	XCG					
X(C)G-03-.20	5.60	1.84	1.16	4	2.25	1.44	2.62	3.56	4.60	2.20	1.12	8.5	9
X(C)G-06-.20	6.95	2.63	1.76	4	2.81	1.62	3.12	3.88	5.95	2.70	1.41	13.5	14
X(C)G-10-.20	8.32	2.82	1.76	6	3.75	2.00	3.94	5.12	7.19	3.55	1.88	26	27



Maximum Inlet Pressure (Recommended)..... 3000 PSI  
A differential of at least 150 PSI between inlet and outlet pressure must be maintained for proper functioning.

Contact your Sperry Vickers Application Engineer, if maximum inlet pressure is needed with minimum rated reduced pressure.

#### Drain Connection

Must be piped directly to tank through a surge free line. Drain line pressure must not exceed 25 PSI. (Should the system require up to 3000 PSI at this port, this pressure must be added to the valve pressure setting).

#### Oil Viscosity Recommended

Oil viscosity ranging between 150 and 225 SUS at 100°F. for ambient temperature above 65° is recommended.

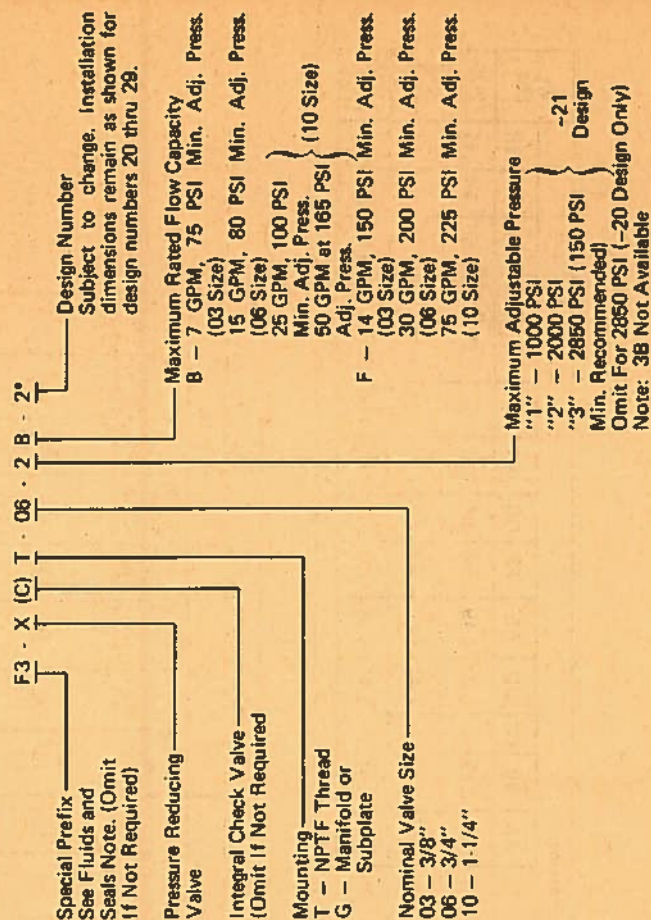
#### Filtration

..... 25 Micron

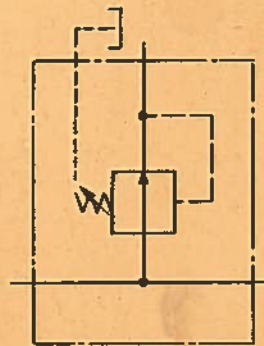
#### Fluids and Seals

The use of synthetic, fire-resistant fluids require a valve with special seals. Add prefix "F3" to model number when phosphate esters type fluids or its blends are to be used. Water glycol, water-in-oil emulsion fluids and petroleum oil may be used with standard seals. Refer to data sheet I-286-S for hydraulic fluid and temperature recommendations.

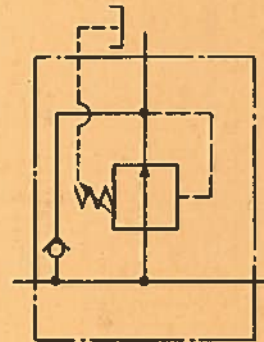
#### Model Code



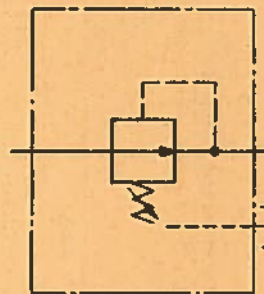
#### STANDARD GRAPHICAL SYMBOL FOR FLUID POWER DIAGRAMS



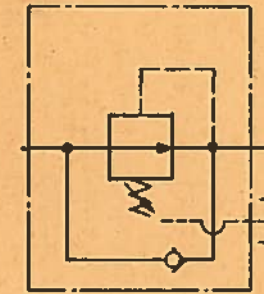
XT.\*\*.\*-2°



XCT.\*\*.\*-2°



XG.\*\*.\*-2°



XCG.\*\*.\*-2°

512410-3



# VICKERS PRESSURE REDUCING VALVE

FLANGE—CONNECTIONS

MODEL NUMBER	PIPE SIZE	RATED CAPACITY G.P.M.	OUTLET PRESSURE RANGE LB./SQ. IN.
XF-16-F-10	1-1/2 OR 2"	90 TO 125	100 TO 2850

OPERATION IS SUCH THAT REDUCED OUTLET PRESSURE IS MAINTAINED CONSTANT REGARDLESS OF VARIATIONS OF INLET PRESSURE ABOVE THE SELECTED PRESSURE SETTING. REFER TO MODEL XCF-16-F-10 FOR VALVE HAVING INTEGRAL CHECK TO ACCOMMODATE REVERSE FREE FLOW.

OIL VISCOSITY RANGING BETWEEN 150 AND 225 S.S.U. AT 100°F. FOR AMBIENT TEMPERATURES ABOVE 65°F. IS RECOMMENDED.

ADJUSTMENT OF REDUCED OUTLET PRESSURE IS ACCOMPLISHED BY LOOSENING JAM NUT AND TURNING PRESSURE-ADJUSTMENT CONTROL SCREW. CLOCKWISE ROTATION INCREASES PRESSURE, COUNTER-CLOCKWISE ROTATION DECREASES PRESSURE. CONTROL ADJUSTMENT HAS STOPS FOR MINIMUM AND MAXIMUM PRESSURE.

MAXIMUM INLET PRESSURE RECOMMENDED-----3000 LBS./SQ. IN.

CONNECTION FLANGES ARE AVAILABLE FROM VICKERS AND ARE NOT INCLUDED WITH THE MODEL LISTED. 1-1/2 OR 2" SIZE FLANGES ARE OPTIONAL. REFER TO FLANGE DATA SHEET 132140 AND SPECIFY FLANGES REQUIRED IN ADDITION TO VALVE.

EXAMPLE: (1) XF-16-F-10-VALVE  
(3) FL-16-PS-20-FLANGES (STRAIGHT)

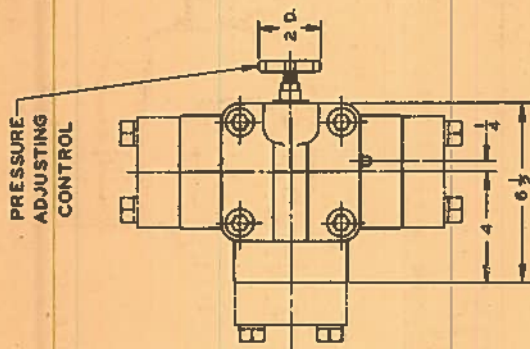
WEIGHT (APPROX.)-----60 LBS.

OPTIONAL POSITIONS OF ADJUSTING SCREW WHICH CAN BE OBTAINED BY ROTATING COVER ASSEMBLY

EXAMPLE OF MODEL NUMBER

MODEL	DESIGN
XF-16-F	10 VALVE
FL-16-PS	20 FLANGE

DESIGN NUMBERS SUBJECT TO CHANGE. INSTALLATION DIMENSIONS REMAIN AS SHOWN FOR DESIGN NUMBERS 10 TO 19 ON VALVE AND 20 TO 29 ON FLANGES.



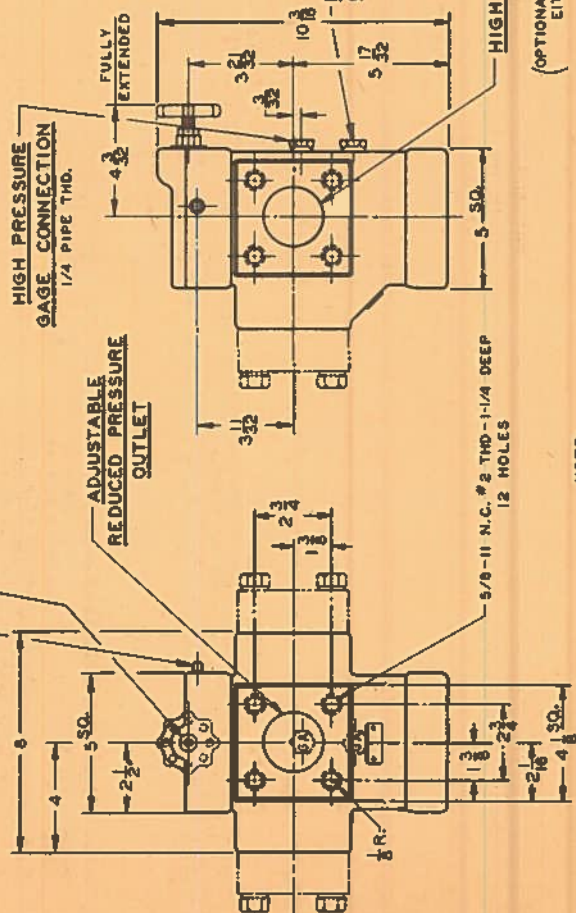
## ▲ DRAIN CONNECTION

DRAIN CONNECTION MUST BE CONNECTED DIRECTLY TO TANK THRU A SURGE FREE LINE. ANY PRESSURE AT THIS POINT IS ADDITIVE TO THE PRESSURE SETTING.

## REMOTE CONTROL CONNECTION

REDUCED PRESSURE MAY BE ADJUSTED REMOTELY BY CONNECTING THIS PORT TO THE PRESSURE INLET PORT OF A CGR-02-X-10 VALVE (DRAWING 234598), OR C-175-X-10 VALVE (DRAWING 22072). PRESSURE SETTING OF THE MAIN VALVE MUST BE HIGHER THAN THAT OF THE REMOTE CONTROL.

## ▲ DRAIN CONNECTION (CONNECT TO TANK) 1/4 PIPE THD.



NOTE:

A DIFFERENTIAL OF AT LEAST 150 PSI BETWEEN INLET AND OUTLET PRESSURES MUST BE MAINTAINED FOR PROPER FUNCTIONING.

REVISED 6-30-62 R.W.S.

VICKERS INC. **REPRODUCED**  
DIVISION OF SPERRY RAND CORPORATION  
INSTALLATION DRAWING  
THIS DRAWING RELEASED 11-22-90  
I-135010  
REVISION 1-1-60 J.A.H.

SUPPLEMENT 5-110180

PRESSURE  
CONTROLS

REDUCING  
VALVES

HYDROCUSHION  
TYPE

1-1/2 OR 2"  
PIPE SIZES

VICKERS FLANGE  
CONNECTIONS

INST. DRWG.  
I-135010



# **VICKERS** PRESSURE REDUCING & CHECK VALVE FLANGE CONNECTIONS

MODEL NUMBER	PIPE SIZE	RATED CAPACITY G.P.M.	OUTLET PRESSURE RANGE LB./SQ. IN.
XCF-16-F-10	1-1/2 OR 2"	90 TO 125	100 TO 2850

OPERATION IS SUCH THAT REDUCED OUTLET PRESSURE IS MAINTAINED CONSTANT REGARDLESS OF VARIATIONS OF INLET PRESSURE ABOVE THE SELECTED PRESSURE SETTING. REVERSE FREE FLOW FROM "REDUCED PRESSURE OUTLET" CONNECTION TO "HIGH PRESSURE INLET" CONNECTION IS PROVIDED BY INTEGRAL CHECK VALVE.

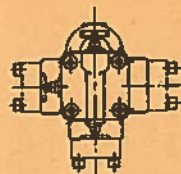
OIL VISCOSITY RANGING BETWEEN 150 AND 225 S.S.U. AT 100°F. FOR AMBIENT TEMPERATURES ABOVE 65°F. IS RECOMMENDED.

ADJUSTMENT OF REDUCED OUTLET PRESSURE IS ACCOMPLISHED BY LOOSENING JAM NUT AND TURNING PRESSURE ADJUSTMENT CONTROL SCREW. COUNTERCLOCKWISE ROTATION INCREASES PRESSURE; COUNTERCLOCKWISE ROTATION DECREASES PRESSURE.

MAXIMUM INLET PRESSURE RECOMMENDED-----3000 LBS./SQ. IN. CONNECTION FLANGES ARE AVAILABLE FROM VICKERS AND ARE NOT INCLUDED WITH THE MODEL LISTED. 1-1/2 OR 2" SIZE FLANGES ARE OPTIONAL. REFER TO FLANGE DATA SHEET I32140 AND SPECIFY FLANGES REQUIRED IN ADDITION TO VALVE.

EXAMPLE: (1) XCF-16-F-10 VALVE  
(3) FL-16-PS-20 FLANGES (STRAIGHT)

WEIGHT (APPROX.)-----85 LBS.

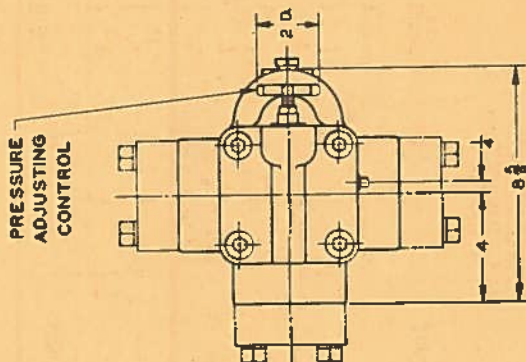


OPTIONAL PORTIONS OF ADJUSTING SCREW, WHICH CAN BE OBTAINED BY ROTATING COVER ASSEMBLY.

## EXAMPLE OF MODEL NUMBER

MODEL	DESIGN
XCF-16-F	10 VALVE
FL-16-PS	20 FLANGE

DESIGN NUMBERS SUBJECT TO CHANGE  
INSTALLATION DIMENSIONS REMAIN AS SHOWN FOR DESIGN NUMBERS 10 TO 18 ON VALVE AND 20 TO 29 ON FLANGES.



PRESSURE ADJUSTING CONTROL

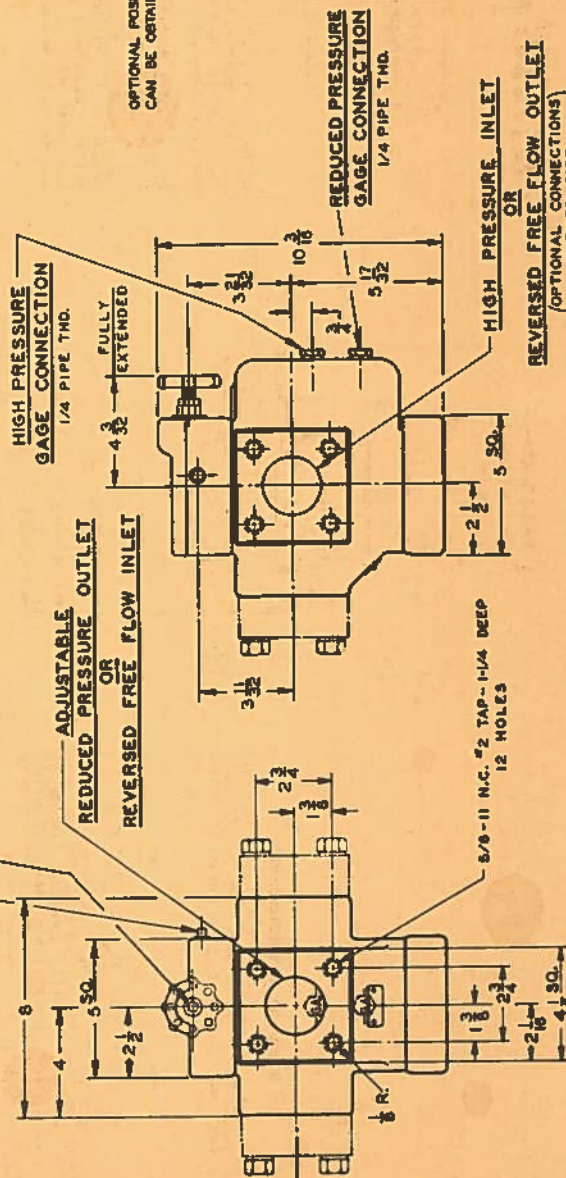
## ▲ DRAIN CONNECTION

DRAIN CONNECTION MUST BE CONNECTED DIRECTLY TO TANK THRU A SURGE FREE LINE. ANY PRESSURE AT THIS POINT IS ADDITIVE TO THE PRESSURE SETTING.

## REMOTE CONTROL CONNECTION

REDUCED PRESSURE MAY BE ADJUSTED REMOTELY BY CONNECTING THIS PORT TO THE PRESSURE INLET PORT OF A CCR-12 VALVE (DRAWING 234596), OR C-12 VALVE (DRAWING 122072). PRESSURE SETTING OF THE MAIN VALVE MUST BE HIGHER THAN THAT OF THE REMOTE CONTROL.

## ▲ DRAIN CONNECTION (CONNECT TO TANK) 1/4 PIPE THD.



REVERSED FREE FLOW OUTLET  
(OPTIONAL CONNECTIONS)  
EITHER SIDE

NOTE:  
A DIFFERENTIAL OF AT LEAST 150 PSI BETWEEN INLET AND OUTLET PRESSURES MUST BE MAINTAINED FOR PROPER FUNCTIONING.



**SPERRY VICKERS**  
TROY, MICHIGAN 48064

**PRESSURE  
REDUCING  
MODULE**

**HYDROCUSHION  
TYPE**

**3/8" & 1/2"  
PIPING**

**MANIFOLD OR  
SUBPLATE MOUNTING**

**DWG. NO.  
512590**

**General Data**

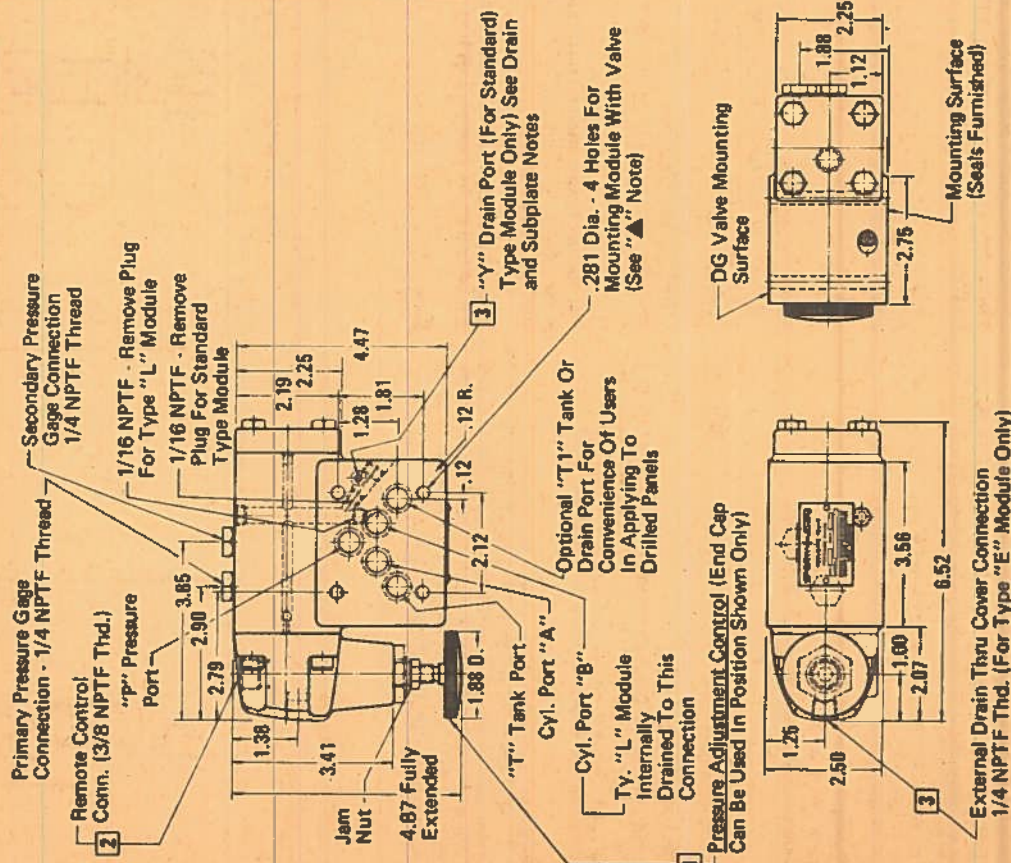
The operation of these pressure reducing modules is such that reduced outlet pressure is maintained constant, regardless of variation or inlet pressure above the selected pressure setting.

Flow Ratings GPM (Maximum - (See Note 4))

DGX-01-8"-5° (75 psi min. adj. pressure) ..... 7  
DGX-01-F"-5° (250 psi min. adj. pressure) ..... 14

Adjustable Pressure (Maximum)

"1" ..... 1000 psi  
"2" ..... 2850 psi (150 psi min. recommended)  
"3" ..... 2000 psi



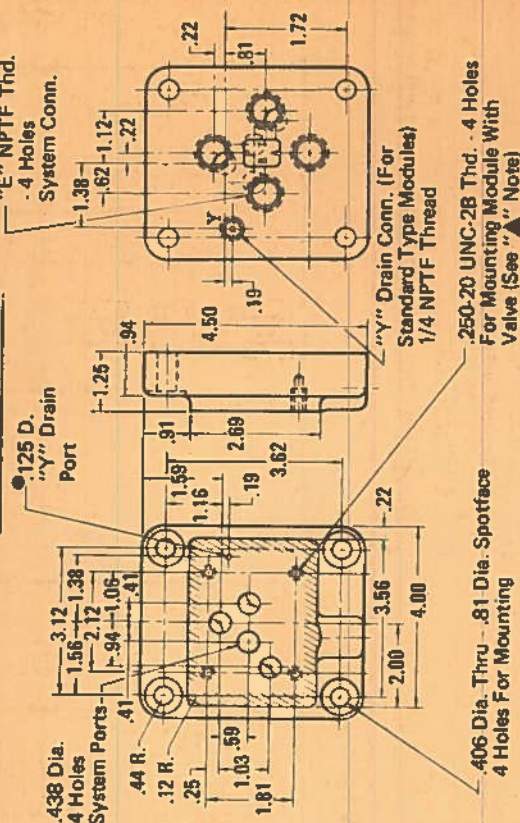
Revised 1-3-78

**SPERRY VICKERS**  
T.M.

**HYDRAULIC PRESSURE  
REDUCING MODULE**

MODEL SERIES DGX-01-\*\*-5°  
MANIFOLD OR SUBPLATE MOUNTING

**MOUNTING SUBPLATES**



Subplate Model Numbers	"E" NPTF Thread	Weight Lbs. (Approx.)
DGSM-01X-10	3/8	4-1/2
DGSM-01Y-10	1/2	
DGRXM-01Y-10		

• DGRXM-01"-10 subplates have "Y" drain connection and are used for standard type module. Mount module atop subplate or manifold with a drain port provided. (Except DGR-01-2-5° which also has a drain requirement.)

**Mounting Subplates & Bolt Kits**

Valves, modules, subplates and mounting bolts must be ordered separately.

Example: One (1) DG4S4-012C-5° Valve  
One (1) DGX-01-2B-5° Module  
One (1) DGRXM-01X-10 Subplate  
One (1) BKDGRX01-689 Bolt Kit

Side connection subplates without drain connection "Y" are also available with 3/8" and 1/2" pipe threads. See drawing no. 522600.

**"A" Note:**

Maximum recommended module with valve mounting bolt torque ..... 112 lbs. in. When subplate is not used, a machined pad (as indicated by subplate shaded area) must be provided for mounting; pad must be flat within .0005 inch and smooth within 63 microinch. Mounting bolts, when provided by customer, should be SAE grade 7 or better.

512590



# **1 Pressure Adjustment**

Adjustment or reduced outlet pressure is accomplished by loosening jam nut and turning pressure adjustment control. Clockwise rotation increases pressure; counterclockwise rotation decreases pressure. Control adjustment has stops for minimum and maximum pressure.

## **Pressure Setting**

A differential of at least 150 psi between inlet and outlet pressures must be maintained for proper functioning.

## **Pressures**

Maximum inlet pressure recommended. . . . . 3000 psi

# **2 Remote Pressure Adjustment**

Reduced pressure may be adjusted remotely by connecting this port to the pressure inlet port of a CGR-02-.20 valve, or C-175-.10 valve. Pressure setting of the main valve must be higher than that of the remote control.

## **3 Drain**

The type "E" and standard reducing valve drain must be piped directly to tank through a surge free line. Drain line pressure must not exceed 25 psi. The drain line for type "L" valves may be subjected to pressure up to 3000 psi. This pressure must be added to the reduced pressure setting.

- 4 Contact your Sperry Vickers application engineer, if maximum inlet pressure is needed with minimum rated reduced pressure.

## **Fluid and Temperature**

An oil viscosity ranging between 150 SSU (light) and 225 SSU (medium) at 100°F., for ambient temperatures above 65°F., is recommended. Refer to data sheet I-286-S for hydraulic fluid and temperature recommendations.

## **Fluids and Seals**

The use of synthetic, fire resistant fluids requires the use of special seals (see model code) water glycol, water-in-oil emulsions, and petroleum oil may be used with standard seals.

## **Pressure Drop (Approx.)**

Through the module at 14 gpm and 100 SSU is 16 psi.

## **Note:**

For further information on installation, ratings, and performance data, refer to drawing (517401 section F) on directional valve used with this module.

Mounting bolt kits used with DG valve and two or three modules are located in the accessory section.

Weight Lbs. (Approx.). . . . . 12

## **Model Code**

F3 - D G X - 01 - . . . . . 5"

## **Design Number**

Subject to change. Installation dimensions remain as shown for design numbers 50 thru 59.

## **Module Type:**

Standard - Directly operated, externally drained to "Y" port. (Omit from model no.)

"E" Ty. - Direct oper., externally drained thru cover.

"L" Ty. - Direct oper., internally drained to "B" port

## **Flow Rating (Maximum)**

"B" - 7 gpm, 75 psi min. adj. press.

"F" - 14 gpm, 250 psi min. adj. press.

## **Adjustable Pressure (Maximum)**

"1" - 1000 psi

"2" - 2000 psi

"3" - 2850 psi (150 psi min. recommended) 3 B combination not available.

## **Module Size**

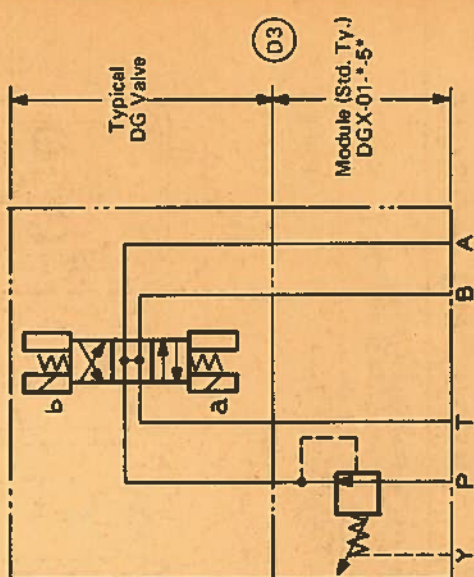
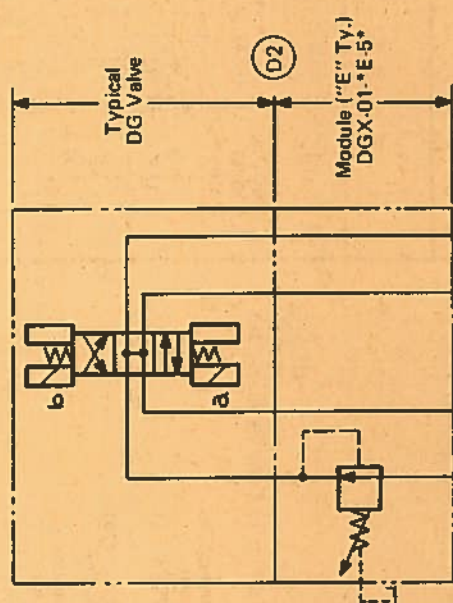
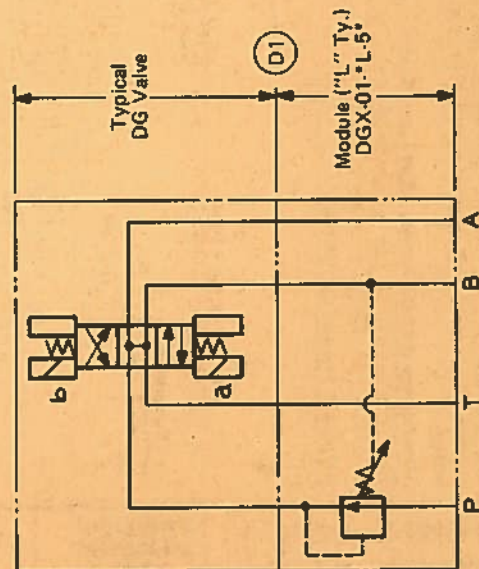
Pressure Reducing Module

Manifold or Subplate Mounting

## **Directional Control**

Special Seals (Omit if not required) See fluids and seals note.

## **GRAPHICAL SYMBOLS (DG VALVE WITH MODULE)**





## GENERAL DATA

THE OPERATION OF THESE PRESSURE REDUCING MODULES IS SUCH THAT REDUCED OUTLET PRESSURE IS MAINTAINED CONSTANT, REGARDLESS OF VARIATION OF INLET PRESSURE ABOVE THE SELECTED PRESSURE SETTING.

FLOW RATINGS GPM (MAXIMUM) - (SEE NOTE 4)

DGX-06-B-5" (80 PSI MIN. ADJ. PRESSURE).....15

DGX-06-F-5" (200 PSI MIN. ADJ. PRESSURE).....30

ADJUSTABLE PRESSURE PSI (MAXIMUM)

"2".....1000

"3".....2000

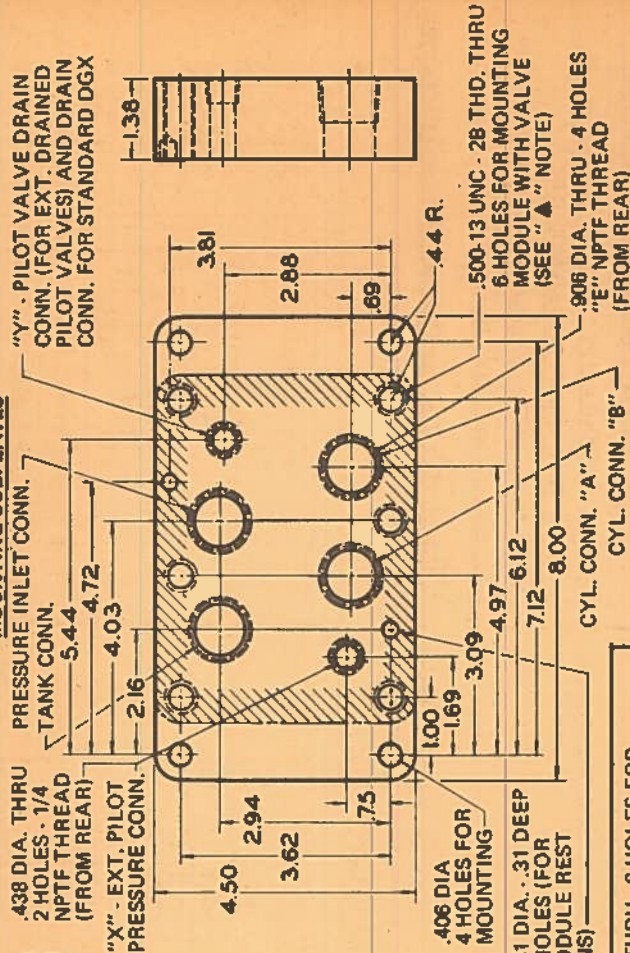
.....3000 (150 PSI MIN. RECOMMENDED)

**SPERRY-VICKERS**  
T.M.

# HYDRAULIC PRESSURE REDUCING MODULE

MODEL SERIES DGX-06-B-5"  
MANIFOLD OR SUBPLATE MOUNTING

## MOUNTING SUBPLATES



SUBPLATE MODEL NUMBERS	"E" NPTF THREAD	WEIGHT LBS. (APPROX.)
DGSM-06-50	3/4"	11
DGSM-06X-50	1"	

## MOUNTING SUBPLATES &amp; BOLT KITS

VALVES, MODULES, SUBPLATES AND MOUNTING BOLTS MUST BE ORDERED SEPARATELY.

EXAMPLE:

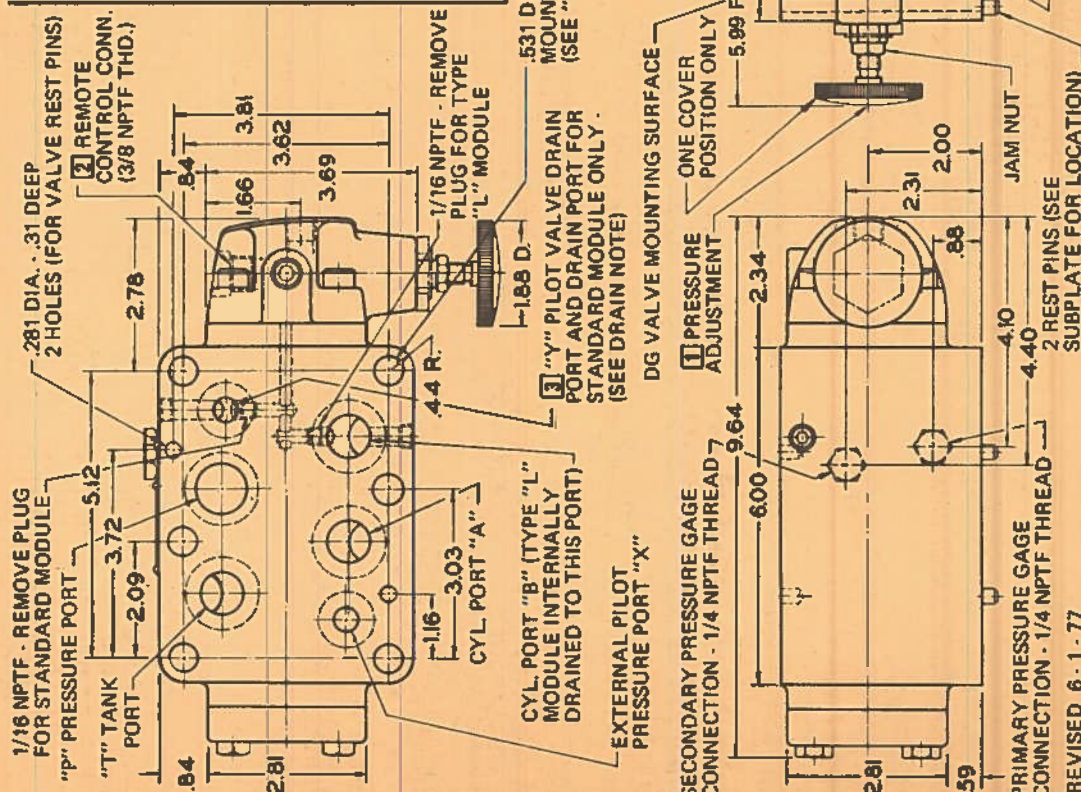
- ONE (1) DG554-062C-5" VALVE
- ONE (1) DGX-06-B-5" MODULE
- ONE (1) DGSM-06-50 SUBPLATE
- ONE (1) BKDGRX06-691 BOLT KIT

SIDE CONNECTION SUBPLATES ALSO ARE AVAILABLE WITH 3/4" & 1" PIPE THREADS. SEE DRAWING NO. 522600.

"A" NOTE:

MAXIMUM RECOMMENDED MODULE WITH VALVE MOUNTING BOLT TORQUE.....700 IN. LBS. WHEN SUBPLATE IS NOT USED, A MACHINED PAD (AS INDICATED BY SUBPLATE SHADED AREA) MUST BE PROVIDED FOR MOUNTING; PAD MUST BE FLAT WITHIN .0005 INCH AND SMOOTH WITHIN 63 MICROINCH. MOUNTING BOLTS, WHEN PROVIDED BY CUSTOMER, SHOULD BE SAE GRADE 7, OR BETTER.

512750



**SPERRY-VICKERS**  
TROY, MICHIGAN 48064

PRESSURE REDUCING MODULE

HYDROCUSHION TYPE

3/4" & 1" PIPING SIZES

MANIFOLD OR SUBPLATE MOUNTING

DWG. NO. 512750



- [1] PRESSURE SETTING**  
ADJUSTMENT OF REDUCED OUTLET PRESSURE IS ACCOMPLISHED BY LOOSENING JAM NUT AND TURNING PRESSURE ADJUSTMENT CONTROL. COUNTERCLOCKWISE ROTATION INCREASES PRESSURE; COUNTERCLOCKWISE ROTATION DECREASES PRESSURE. CONTROL ADJUSTMENT HAS STOPS FOR MINIMUM AND MAXIMUM PRESSURE.
- PRESSURE SETTING**  
A DIFFERENTIAL OF AT LEAST 150 PSI BETWEEN INLET AND OUTLET PRESSURES MUST BE MAINTAINED FOR PROPER FUNCTIONING.
- PRESSURES**  
MAXIMUM INLET PRESSURE. . . . . 3000 PSI
- [2] REMOTE PRESSURE ADJUSTMENT**  
REDUCED PRESSURE MAY BE ADJUSTED REMOTELY BY CONNECTING REMOTE CONTROL CONN. TO THE PRESSURE INLET PORT OF A CGR-02-20 VALVE OR C-175-10 VALVE. PRESSURE SETTING OF THE MAIN VALVE MUST BE HIGHER THAN THAT OF THE REMOTE CONTROL.
- [3] DRAIN**  
"Y" PORT - MUST BE PIPED DIRECTLY TO TANK THROUGH A SURGE FREE LINE SUCH THAT THERE WILL BE NO BACKPRESSURE AT THE VALVE DRAIN PORT. TRANSIENT PRESSURE MUST NOT EXCEED 5 PSI.
- PORT "B" TYPE L AND COVER DRAIN, TYPE E - MAY BE SUBJECTED TO PRESSURE UP TO 3000 PSI; THIS PRESSURE IS ADDITIVE TO THE REDUCED PRESSURE SETTING.
- [4] CONTACT YOUR SPERRY VICKERS APPLICATION ENGINEER, IF MAXIMUM INLET PRESSURE IS NEEDED WITH MINIMUM RATED REDUCED PRESSURE.**

**FLUID AND TEMPERATURE**  
AN OIL VISCOSITY RANGING BETWEEN 150 SSU (LIGHT) AND 225 SSU (MEDIUM) AT 100° F., FOR AMBIENT TEMPERATURES ABOVE 65° F., IS RECOMMENDED. REFER TO DATA SHEET 1-286-S FOR HYDRAULIC FLUID AND TEMPERATURE RECOMMENDATIONS.

**FLUIDS AND SEALS**  
THE USE OF SYNTHETIC, FIRE-RESISTANT FLUIDS REQUIRES THE USE OF SPECIAL SEALS (SEE MODEL CODE) WATER GLYCOL, WATER-IN-OIL EMULSIONS, AND PETROLEUM OIL MAY BE USED WITH STANDARD SEALS.

**PRESSURE DROP (APPROX.)**  
THROUGH THE MODULE AT 30 GPM AND 100 SSU IS 22 PSI.

**WEIGHT LBS. (APPROX.)** . . . . . 26

**NOTE:**  
FOR FURTHER INFORMATION ON INSTALLATION, RATINGS, AND PERFORMANCE DATA, REFER TO DRAWING OF DIRECTIONAL VALVE USED WITH THIS MODULE.

MOUNTING BOLT KITS USED WITH DG VALVE AND TWO OR THREE MODULES ARE LOCATED IN THE ACCESSORY SECTION.

**MODEL CODE**  
F3 - DGX - 06 - - - - - 5°

**DESIGN NUMBER**  
SUBJECT TO CHANGE. INSTALLATION DIMENSIONS REMAIN AS SHOWN FOR DESIGNS 50 THRU 59.

**MODULE TYPE**  
STANDARD - DIRECTLY OPERATED EXTERNALLY DRAINED TO "Y" PORT (OMIT FROM MODEL NO.)  
"E" TYPE - DIRECT. OPER. EXTERNALLY DRAINED THRU COVER.  
"L" TYPE - DIRECT. OPER. INTERNALLY DRAINED TO "B" PORT.

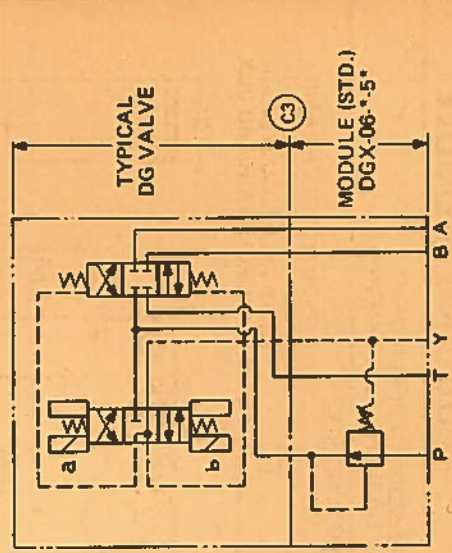
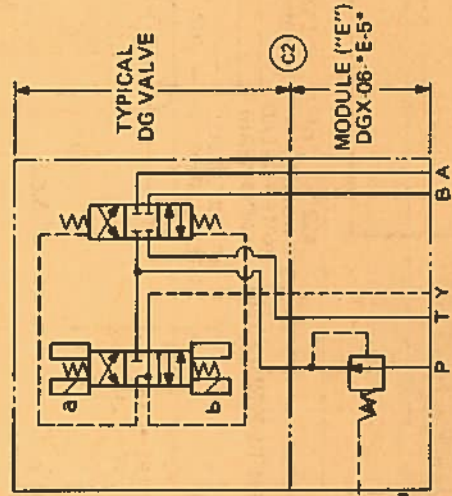
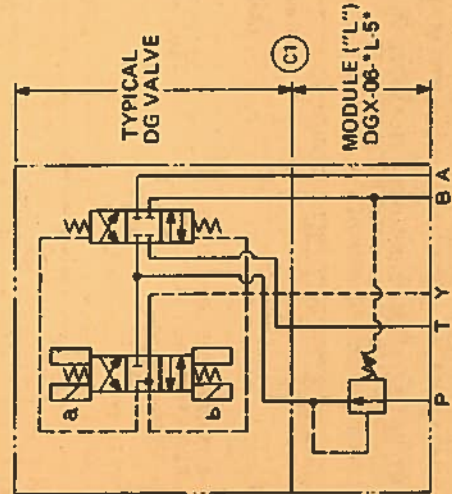
**FLOW RATINGS GPM (MAXIMUM)**  
"B" - 15 (80 PSI MIN. ADJ. PRESSURE)  
"F" - 30 (200 PSI MIN. ADJ. PRESSURE)

**ADJUSTABLE PRESSURE PSI (MAXIMUM)**  
"1" - 1000  
"2" - 2000  
"3" - 3000 (150 PSI MIN. RECOMMENDED)  
(3B COMBINATION NOT AVAILABLE)

**MODULE SIZE**  
PRESSURE REDUCING MODULE  
MANIFOLD OR SUBPLATE MOUNTING  
DIRECTIONAL CONTROL

**SPECIAL SEALS**  
(OMIT IF NOT REQUIRED) SEE FLUIDS AND SEALS NOTE.

GRAPHICAL SYMBOLS (DG VALVE WITH MODULE)





**SPERRY VICKERS**  
T.M.

**THREADED CONNECTIONS OR SUBPLATE  
MOUNTED 100 PSI TO 5000 PSI AC OR DC**

## GENERAL USAGE

USED IN AN OIL HYDRAULIC SYSTEM REQUIRING AN ADJUSTABLE PRESSURE  
ACTUATED ELECTRICAL SWITCH TO MAKE OR BREAK AN ELECTRIC CIRCUIT  
AT A SET HYDRAULIC PRESSURE.

## STANDARD GRAPHICAL SYMBOL FOR FLUID POWER DIAGRAMS

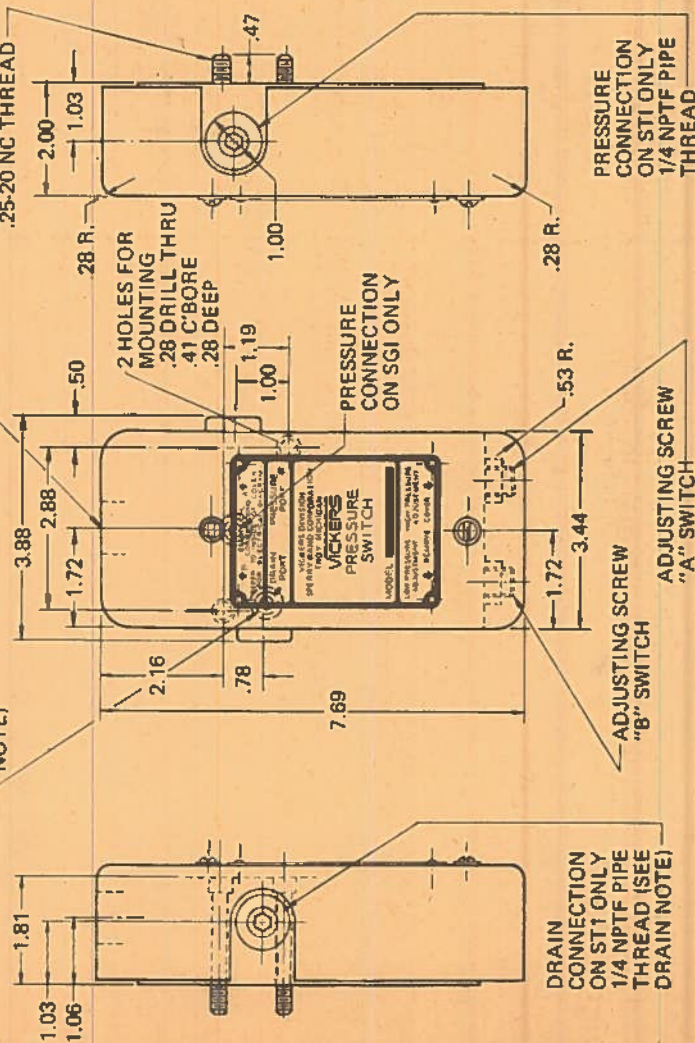


**OPERATION**  
ADJUSTMENT OF PRESSURE SETTINGS ARE ADJUSTABLE THROUGHOUT COMPLETE PRESSURE RANGE. REMOVE COVER AND TURN HIGH PRESSURE ADJUSTING SCREW ("A" SWITCH) CLOCKWISE TO INCREASE; COUNTERCLOCKWISE TO DECREASE PRESSURE SETTING. LOW PRESSURE ADJUSTMENT ("B" SWITCH) CAN BE SET FOR DESIRED DIFFERENTIAL BETWEEN CUT-IN AND CUT-OUT PRESSURE. 75 PSI MINIMUM PRESSURE DIFFERENTIAL.

MODEL NUMBER	PIPE THD. SIZE	RECOMMENDED PRESSURE RANGE	ELECTRICAL CURRENT RATING			
			AMP.	A.C. VOLTS	AMP.	D.C. VOLTS
STI/SGI-02-10-10	1/4"	100 - 1000 PSI	10	@ 115	5	@ 6
STI/SGI-02-20-10		100 - 2000 PSI	5	@ 230	3	@ 24
STI/SGI-02-50-10		500 - 5000 PSI	3	@ 460	.5	@ 125

**DRAIN CONNECTION**  
**ON-SI ONLY**  
**(SEE DRAIN**  
**NOTE)**

MOUNTING SCREWS  
FURNISHED WITH  
SGI ONLY  
35 20 NC THREAD



## MOUNTING SUBPLATES

.25 DRILL THRU.  
.44 DRILL.  
.75 DEEP (MAX.)  
.25 NPTF PIPE TAP.  
2 HOLES

## MOUNTING SUBPLATES

**VALVES AND SUBPLATES MUST BE ORDERED SEPARATELY.**

EXAMPLE: ONE (1) SGI-02-10-10 PRESSURE SWITCH  
ONE (1) SGISM-02-10 SUBPLATE

WHEN SUBPLATE IS NOT USED, A MACHINED PAD (AS INDICATED BY SUBPLATE SHADED AREA) MUST BE PROVIDED FOR MOUNTING; PAD MUST BE FLAT WITHIN .0005 INCH AND SMOOTH WITHIN 63 MICROINCH. MOUNTING BOLTS, WHEN PROVIDED BY CUSTOMER, SHOULD BE SAE GRADE 7, OR BETTER.

RELEASED 1-2-73

513398A



FLUIDS REFER TO DATA SHEET I-286-S (SECTION L) FOR HYDRAULIC OIL RECOMMENDATIONS.

#### FLUIDS AND SEALS

THE USE OF SYNTHETIC, FIRE RESISTANT FLUIDS REQUIRES A VALVE WITH SPECIAL SEALS. ADD PREFIX "F3" TO MODEL NUMBER WHEN PHOSPHATE ESTERS ARE TO BE USED. WATER GLYCOL, WATER-IN-OIL EMULSIONS AND PETROLEUM OIL FLUIDS MAY BE USED WITH STANDARD SEALS.

#### MOUNTING SCREWS

ACCESSIBLE UNDER COVER. (SCREWS FURNISHED ON SGI ONLY.) BOLT TORQUE 8 FT. LBS.

#### DRAIN

DRAIN CONNECTION MUST BE PIPED DIRECTLY TO TANK AT ATMOSPHERIC PRESSURE THROUGH A SURGE FREE LINE. BACK PRESSURE AT THIS CONNECTION WOULD CAUSE VALVE MALFUNCTION.

#### ELECTRICAL CONNECTIONS

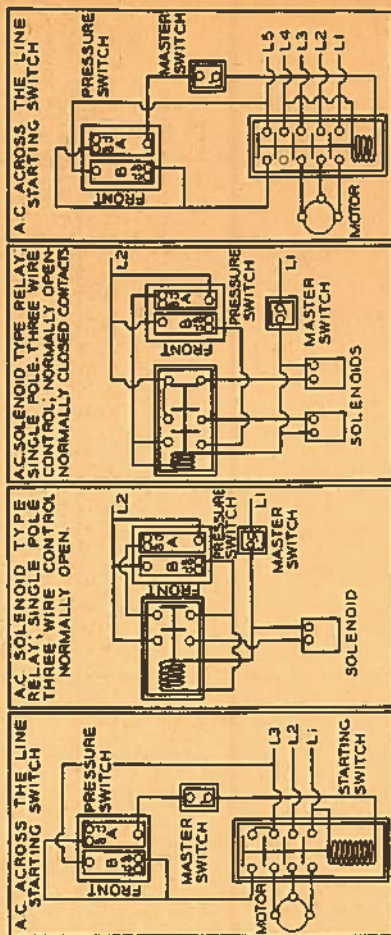
REFER TO CIRCUIT DIAGRAMS SHOWN FOR SUGGESTED CIRCUITS.

WEIGHT LBS. (APPROX.) ..... 6-1/2  
WITH SUBPLATE ..... 11-1/2

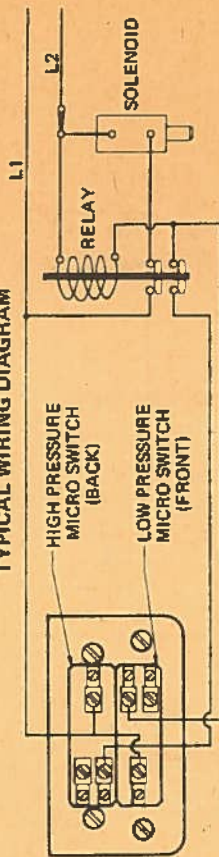
FILTRATION ..... 25 MICRON OR LESS

#### MODEL CODE

SG 1-02-10-10	DESIGN NUMBER SUBJECT TO CHANGE. INSTALLATION DIMENSIONS REMAIN AS SHOWN FOR DESIGN NUMBERS 10 THRU 19.
PRESSURE SWITCH	
TYPE	
SG - SUBPLATE	
ST - THREADED	
DUAL SPRINGS	
MICRO-TYPE	
NOMINAL VALVE SIZE	
02 - 1/4"	
	PRESSURE RANGE (PSI)
	10 - 100-1000
	20 - 100-2000
	50 - 500-5000



TYPICAL WIRING DIAGRAM



TOP VIEW OF ELECTRICAL TERMINALS



FIG. 1  
PRESSURE BELOW  
SETTING OF BOTH  
ADJUSTMENTS

FIG. 2  
PRESSURE BETWEEN  
SETTING OF  
ADJUSTMENTS

FIG. 3  
PRESSURE ABOVE  
SETTING OF BOTH  
ADJUSTMENTS

TYPICAL WIRING DIAGRAM ABOVE WITH TOP VIEW OF ELECTRICAL TERMINALS ILLUSTRATES MAKING AND BREAKING OF CIRCUITS IN VARIOUS PHASES OF OPERATION. "NORMALLY OPEN" CONTACTS IN MICRO-SWITCHES ARE HELD CLOSED BY SPRING LOAD, WHEN PRESSURE IS BELOW HIGH AND LOW PRESSURE SETTINGS. (FIG. 1)

IN FIG. 2 LOW PRESSURE SETTING HAS BEEN EXCEEDED AND HYDRAULIC PRESSURE HAS FORCED SPRING LOADED PLUNGER DOWN TO BREAK ELECTRICAL CONTACT.

IN FIG. 3 BOTH PRESSURE SETTINGS HAVE BEEN EXCEEDED, COMPLETELY BREAKING ELECTRICAL CONTACT.

DIFFERENTIAL FEATURE IS PROVIDED BY INDEPENDENTLY REGULATED SPRING LOAD SETTINGS FOR BOTH HIGH AND LOW PRESSURE ADJUSTMENT.



# NOTES



# HYDRAULIC MOTORS

When your application needs rotary power, Sperry Vickers has a hydraulic motor to do the job.

Sperry Vickers vane motors are of fixed displacement type and feature exclusive dual-alternate pressure plate arrangement that results in high operating efficiencies. They can be reversed from zero to maximum speed in either direction by reversing the oil flow.

The piston type motors are offered either in fixed or variable displacement type. Exclusive use of powdered metallurgy techniques make it possible for Sperry Vickers to offer these exceptionally high performance motors at competitive prices.



# Hydraulic Motors

## piston type

### design characteristics

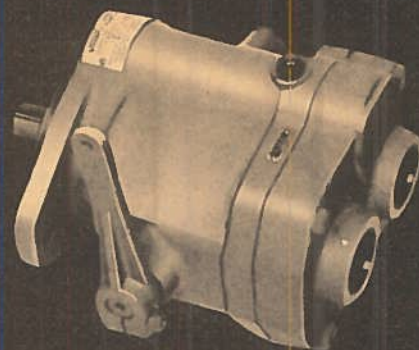
Motors are axial piston, variable or fixed displacement in-line design, and provide power for a wide range of industrial applications. Service may be continuous, intermittent, reversing, or stalled without damage when protected by a relief valve.

### high efficiency

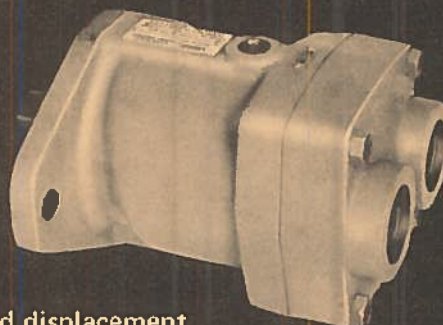
Depending on the specific model selected, over-all operating efficiency can be as high as 95%, volumetric efficiency as high as 99%.

### fixed displacement

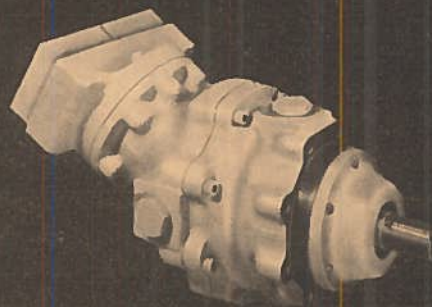
Horsepower output is approximately proportional to speed with a given constant operating pressure. Output speeds are dependent on input flow. Speed ranges of at least 12:1 are possible at maximum torque rating by varying flow to the motor.



variable displacement



fixed displacement

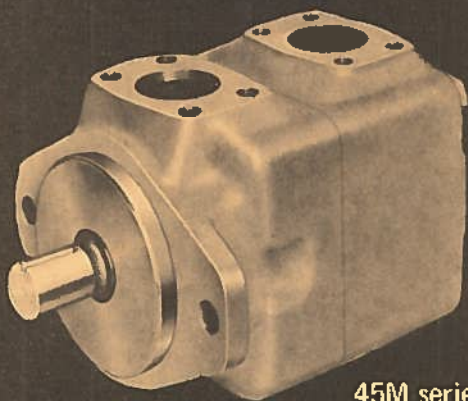


fixed displacement

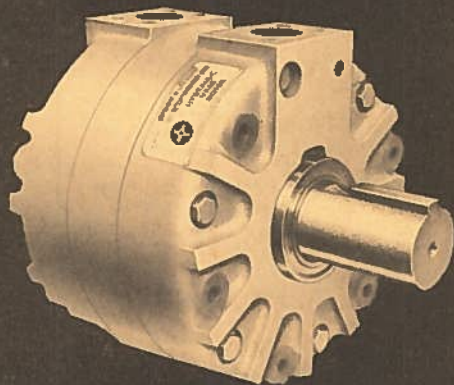


## vane type

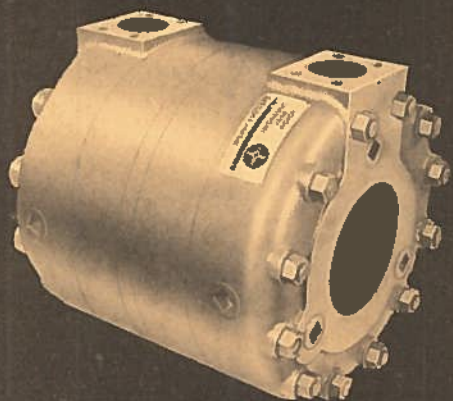
# Hydraulic Motors



45M series



MHT-150



MHT-500 shaftless

### design features

These vane motors automatically maintain optimum running clearances over their complete operating pressure and speed ranges. Inertia of rotating parts is low . . . parts are symmetrical, providing dynamic balance and freedom from vibration. Sperry Vickers "Hydraulic Balance" design eliminates pressure induced bearing loads, a major cause of wear in designs without this feature.

### high torque-low speed

Sperry Vickers high torque-low speed vane motors are capable of smooth motoring speeds (in either direction) throughout their entire pressure and speed range.

Available with torque ratings from 700 to 20,000 lb. ft.

Your choice of either shaft or shaftless models.

In addition to the above, Sperry Vickers has a new series of "Multi-Torque" motors similar to the standard MHT motors. The design of the multi-torque motor permits choosing a number of different speed-and-torque combinations for any given flow and pressure.

These MHT motors can eliminate costly, cumbersome gearboxes and electric motors.



**INDEX**  
**SECTION I - FLUID MOTORS**

DESCRIPTION	THEORETICAL TORQUE PER 100 PSI-LBS. FT.	DWG. NO.	PAGE NO.
<b>Vane Motors</b>			
M2-200 straight vane	to 3	520100	i - 1
M2-200-S2 straight vane	to 3	520110	i - 3
<b>Vane Motors - High Performance</b>			
25M	to 5	520140	i - 5
35M	to 10	520150	i - 9
45M	to 15	520200	i - 13
50M	to 25	520210	i - 17
<b>High Torque - Low Speed Vane Motors</b>			
MHT32 standard	32	520220	i - 21
MHT50 standard	50	520225	i - 23
MHT90/70 standard	70 to 90	520230	i - 26
MHT90/70 multi-torque	35 to 90	520232	i - 29
MHT150/130 standard	130 to 150	520240B	i - 32
MHT150/130 multi-torque	55 to 150	520240B	i - 32
MHT250/220/190 standard	190 to 250	520250B	i - 35
MHT250/220/190 multi-torque	95 to 250	520250B	i - 35
MHT500/440/380 standard	380 to 500	520260B	i - 38
MHT500/440/380 multi-torque	190 to 500	520260B	i - 38
MHT750/690/570 standard	570 to 750	520270	i - 41
MHT750/690 multi-torque	315 to 750	520270	i - 41
MHT1000 standard	1000	520280	i - 44
MHT1000 multi-torque	500 to 1000	520280	i - 44
<b>Piston Motors Inline</b>			
MTR3 fixed	.6	520295	i - 47
MFB5 fixed	.85	520300	i - 48
MFB5-S61 fixed servo type	.85	520302	i - 50
MFB10 fixed	1.7	520305	i - 53
MFB20/29 fixed	3.5 to 5	520310	i - 55
MFB29 fixed - heavy duty	5	520315	i - 58
MFB45 fixed	7.7	520325	i - 60
MVB5 variable	.85	273831	i - 62
MVB10 variable	1.7	273838	i - 64
<b>Piston Motors Angle Type</b>			
MF2000	to 8	136014	i - 66
MFA50/120/150	to 38	520500	i - 67

**MODEL CODES**

Model codes in this catalog list many options. Some possible model combinations are not readily available. Please contact your Sperry Vickers representative to verify availability.



**SPERRY-VICKERS**  
TROY, MICHIGAN 48064

**HYDRAULIC  
MOTORS**

**FIXED  
DISPLACEMENT**

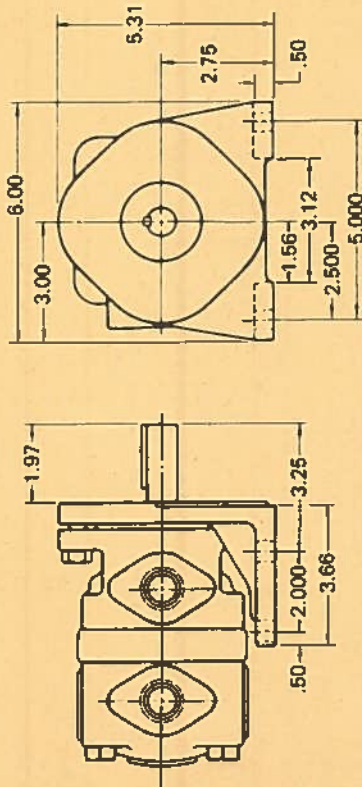
**VANE  
TYPE**

**5.0 OR 6.2  
HORSEPOWER**

**THREADED  
CONNECTIONS**

**2-BOLT FLANGE  
OR FOOT  
MOUNTING**

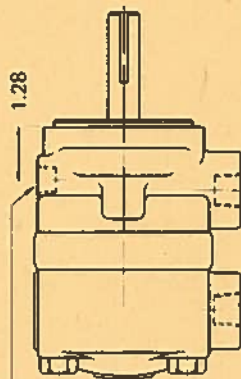
**DWG. NO.  
520100**



**MODEL M2-214-1C  
FOOT MOUNTING**

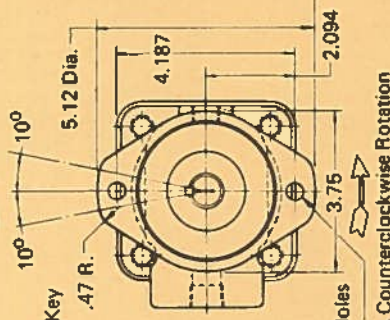
(May be assembled in any one of four positions)

Drain Connection  
3/8 NPTF Pipe Thd.  
(See Note)



Connection "K"  
3/4 NPTF Pipe Thd.

Connection "L"  
3/4 NPTF Pipe Thd.



**MODEL M2-210-1C  
FLANGE MOUNTING**

REVISED 12-1-78

Model Numbers		Normal Ratings		
Flange Mounting	Foot Mounting	Horsepower	Speed RPM	Displacement GPM
M2-210-25-1-11	M2-214-25-1-11	5.0	2200	15.1
M2-210-35-1-11	M2-214-35-1-11	6.2	1800	17.9

**SPERRY-VICKERS**  
T.M.

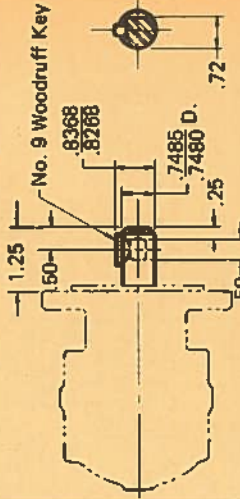
# **HYDRAULIC VANE MOTORS**

## **MODEL SERIES M2-200 FIXED DISPLACEMENT - VANE TYPE**

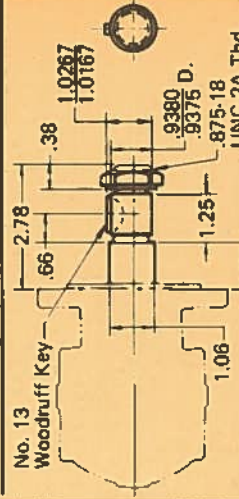
All Fluid Motors Listed are of Sperry Vickers exclusive "balanced vane type" construction. Operating Characteristics are of the variable horsepower class: Horsepower output being proportional to RPM as long as operating pressure is constant. See curves on reverse side. Running Torque: See curves on reverse side.

- Recommended Normal Operating Pressure for best overall efficiency and life is 800 PSI. Maximum pressure is 1000 PSI for intermittent service such as starting and accelerating loads.
- Recommended Speed as indicated in tabulation is maximum RPM for normal operating conditions.
- Normal Minimum Operating Speeds will vary from 50 to 100 RPM depending upon the size of motor and the characteristics of the driven load.

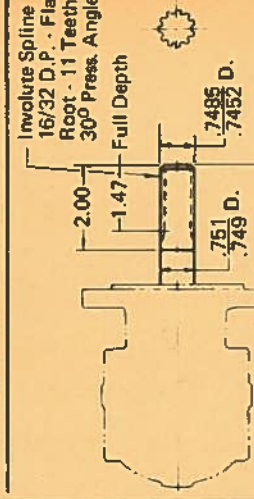
### **OPTIONAL SHAFTS**



**Straight Stub (No. 6) Shaft MODEL M2-21-1-11**



**Threaded (No. 3) Shaft MODEL M2-21-3-11**



**Splined (No. 11) Shaft MODEL M2-21-11-11**



**Output Shaft Rotation** can be from "0" to maximum RPM in either direction.

Oil supply to connection "L" turns shaft clockwise.

Oil supply to connection "K" turns shaft counterclockwise.

Service may be reversing or stalled, under load, without damage to fluid motor. A relief valve is required. May be used where variable speeds are desired.

**Type of Drive:** Direct drive thru flexible coupling is recommended but belt, chain or gear drives can be used. Specific recommendations and data on limitations should be obtained.

**Overall Efficiency** is dependent upon operating pressure, speed, oil viscosity and size of unit. Approximates 70% to 80% under maximum recommended conditions.

#### Fluids

**Petroleum Oils** - Use antiwear industrial hydraulic oils or automotive crankcase oils having letter designations SC, SD or SE. Running viscosity range 70 to 250 SUS, operating temperature 120°F. recommended, 150°F. usual maximum. For details, refer to data sheet 1-286-S for hydraulic fluid and temperature recommendations.

**Control Valving** used in conjunction with these hydraulic motors must have open center crossover feature to prevent cavitation when shaft is subject to overrunning loads.

**Note:** Back pressure on motor(s) not to exceed:

75% of the supply pressure at 1800 RPM

80% of the supply pressure at 1200 RPM

85% of the supply pressure at 600 RPM

**For Example:** At 1000 PSI and 1800 RPM motor speed, the back pressure should not exceed 750 PSI. These are actual operating pressures at the ports of the motor, (such circuits require a relief valve in both inlet and outlet ports).

Consequently, for applications where cavitation, back pressure and/or series type circuits exist, the S2 type of motor is recommended. Please contact your local Sperry Vickers representative for assistance.

#### Model Code

M2 - 2 10 - 25 - 1 A - 1\*

Vane Type Hydraulic Motors (Reversible)

Series 200

Connections  
1 - Threaded

Mounting Type  
0 - 2-Bolt Flange  
4 - Foot

Torque Rating Lb. In./100 PSI (Approx.)  
25 - 25  
35 - 35

Port

Shaft Type

1 - Straight Keyed  
3 - Threaded  
6 - Straight Stub  
11 - Splined

Design Number  
Subject To Change. Installation Dimensions Remain As Shown For Design Numbers 10 Thru 19.

Cover Position

"K" Viewed From Cover End)

A - Cover Port Opposite Body Port

B - Cover Port 90° Counterclockwise From Body Port

C - Port Connections Inline  
D - Cover Port 90° Clockwise From Body Port

#### Drain Connection

A full size unrestricted drain line must be connected directly from the case drain connection to a location below the lowest fluid level in the system reservoir.

Pressure surges at the case drain connection may not exceed 25 PSI. Nominal pressure not to exceed 10 PSI. Minimum pressure 0 PSI.

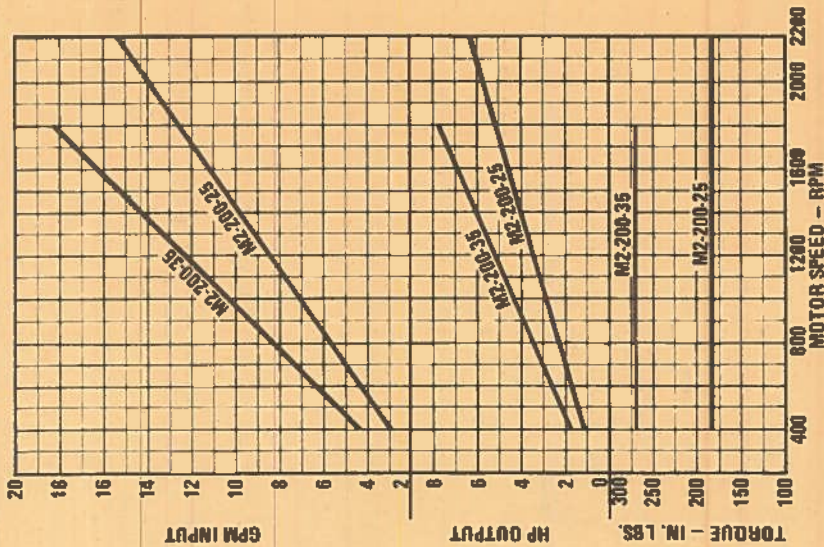
Weight Lbs. (Approx.)

Flange Mounting.....21

Foot Mounting.....26

#### TYPICAL PERFORMANCE CURVES

OIL TEMPERATURE - 120°F - OIL VISCOSITY 150 SSU @ 100°F.  
ALL CURVES SHOW CHARACTERISTICS AT 1000 PSI INLET PRESSURE





**SPERRY VICKERS**  
TROY, MICHIGAN 48064

**HYDRAULIC  
MOTORS**

**FIXED  
DISPLACEMENT**

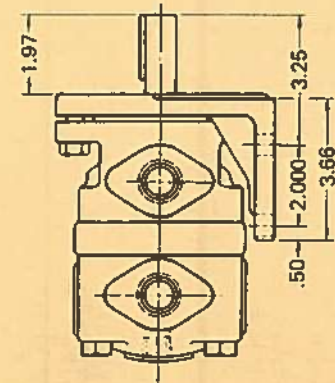
**VANE  
TYPE**

**6.3 OR 7.8  
HORSEPOWER**

**THREADED  
CONNECTIONS**

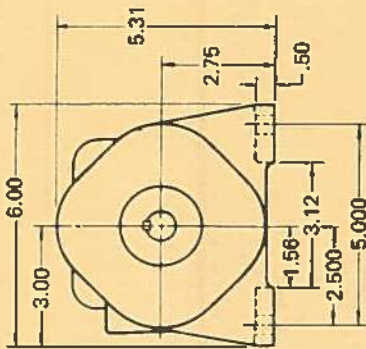
**2-BOLT FLANGE  
OR FOOT  
MOUNTING**

**DWG. NO.  
520110**



**MODEL M2-214\*1C-13-S2  
FOOT MOUNTING**

(May be assembled in any one of four positions)

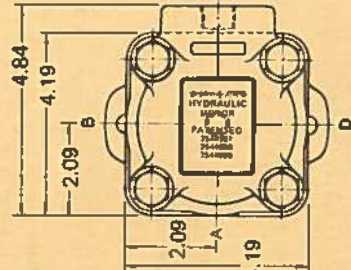
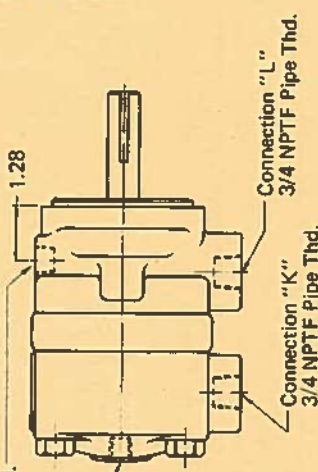


**MODEL M2-210\*1C-13-S2  
FLANGE MOUNTING**

Drain Connection  
3/8 NPTF Pipe Thd.  
(See Note)

"S2" Port Connection  
1/4 NPTF

Note:  
Pilot pressure must be continuously  
supplied at this port at a level equal  
to system pressure plus 75 PSI min-  
imum. This may be obtained by  
using a check valve in the system  
supply and with pilot pressure taken  
from between pump and this valve.



Model Numbers			Maximum Ratings		
Standard Mounting	Foot Mounting	Horsepower	Speed RPM	Displacement GPM	Pressure PSI
M2-210-25-1*13-S2	M2-214-25-1*13-S2	6.3	2200	15.1	At Max. RPM At 1200 RPM
M2-210-35-1*13-S2	M2-214-35-1*13-S2	7.8	1800	18.1	1000 1500

REVISED 12-1-78

**SPERRY VICKERS**  
T.M.

# **HYDRAULIC VANE MOTORS**

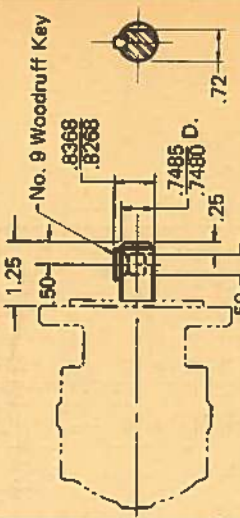
**WITH PRESSURIZED VANE EXTENSION**  
**MODEL SERIES M2-200-S2 FIXED DISPLACEMENT - VANE TYPE**

All Fluid Motors Listed are of Sperry Vickers exclusive "balanced vane type" construction. Operating Characteristics are of the variable horsepower class: Horsepower output being proportional to RPM as long as operating pressure is constant. See curves on reverse side. Running Torque: See curves on reverse side.

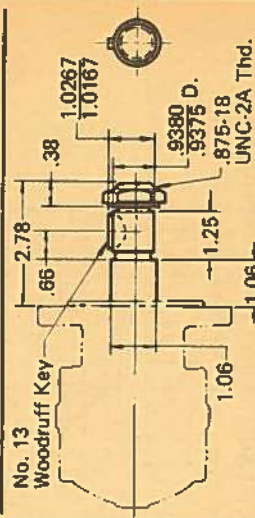
■ Recommended Maximum Operating Pressure: See tabulation below.

■ Recommended Speed as indicated in tabulation is maximum RPM for continuous operation. Recommended Minimum Operating Speeds will vary from 50 to 100 RPM depending upon the size of motor and the characteristics of the driven load.

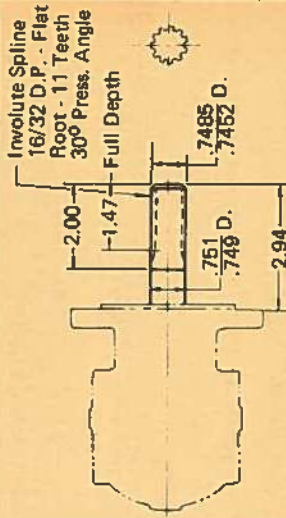
## **OPTIONAL SHAFTS**



**Straight Stub (No. 6) Shaft MODEL M2-21\*1C-13-S2**



**Threaded (No. 3) Shaft MODEL M2-21\*1C-13-S2**



**Splined (No. 11) Shaft MODEL M2-21\*1C-13-S2**

520110



Output Shaft Rotation can be from "0" to maximum RPM in either direction.

Oil supply to connection "L" turns shaft clockwise.

Oil supply to connection "K" turns shaft counterclockwise.

Service may be reversing or stalled, under load, without damage to fluid motor. A relief valve is required. May be used where variable speeds are desired.

Type of Drive: Direct drive thru flexible coupling is recommended but belt, chain or gear drives can be used. Specific recommendations and data on limitations should be obtained.

Overall Efficiency is dependent upon operating pressure, speed, oil viscosity and size of unit. Approximates 70% to 80% under maximum recommended conditions.

# Fluids

Petroleum Oils - Use antiwear industrial hydraulic oils or automotive crankcase oils having letter designations SC, SD or SE. Running viscosity range 70 to 250 SUS, operating temperature 120°F. recommended, 150°F. usual maximum. For details, refer to data sheet I-286-S for hydraulic fluid and temperature recommendations.

Control Valving used in conjunction with these hydraulic motors must have open center crossover feature to prevent cavitation when shaft is subject to overrunning loads. Some circuits require a relief valve in both the inlet and outlet ports.

# Drain Connection

A full size unrestricted drain line must be connected directly from the case drain connection to a location below the lowest fluid level in the system reservoir.

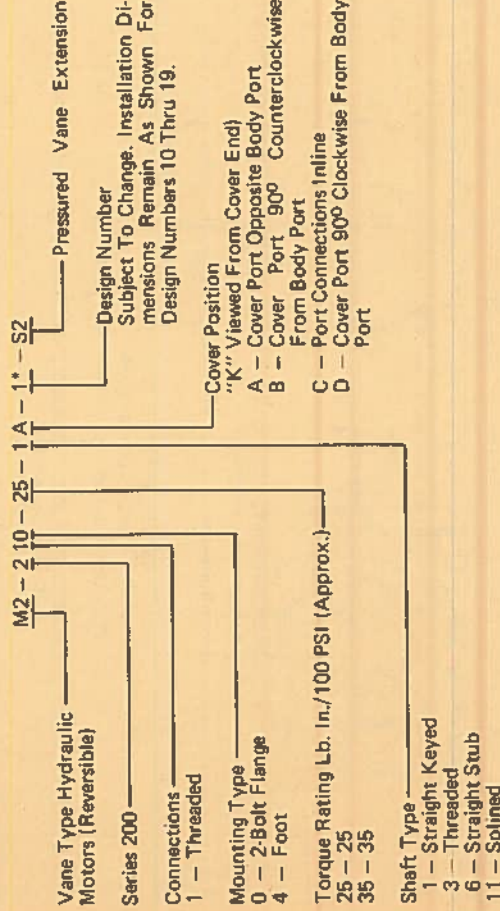
Pressure surges at the case drain connection may not exceed 25 PSI. Nominal pressure not to exceed 10 PSI. Minimum pressure 0 PSI.

# Weight Lbs. (Approx.)

Flange Mounting..... 21

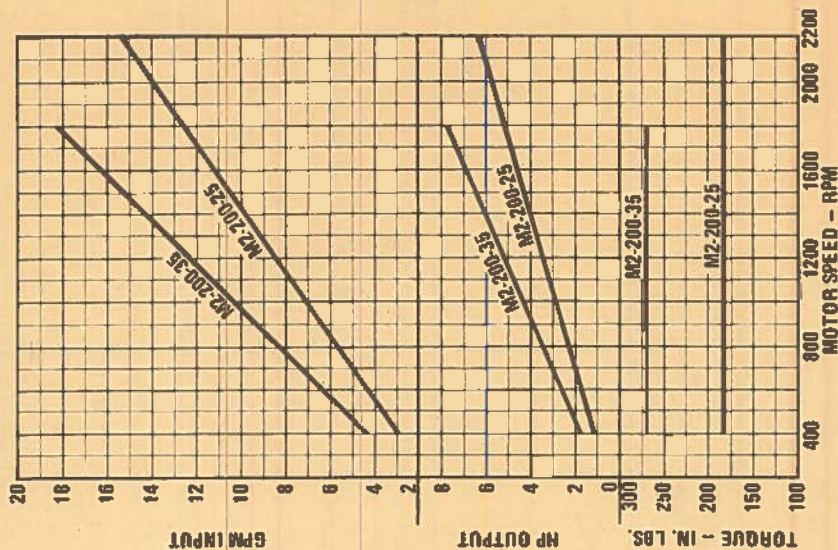
Foot Mounting..... 26

# Model Code



## TYPICAL PERFORMANCE CURVES

OIL TEMPERATURE - 120°F. - OIL VISCOSITY 160 SSU @ 100°F.  
ALL CURVES SHOW CHARACTERISTICS AT 1000 PSI INLET PRESSURE





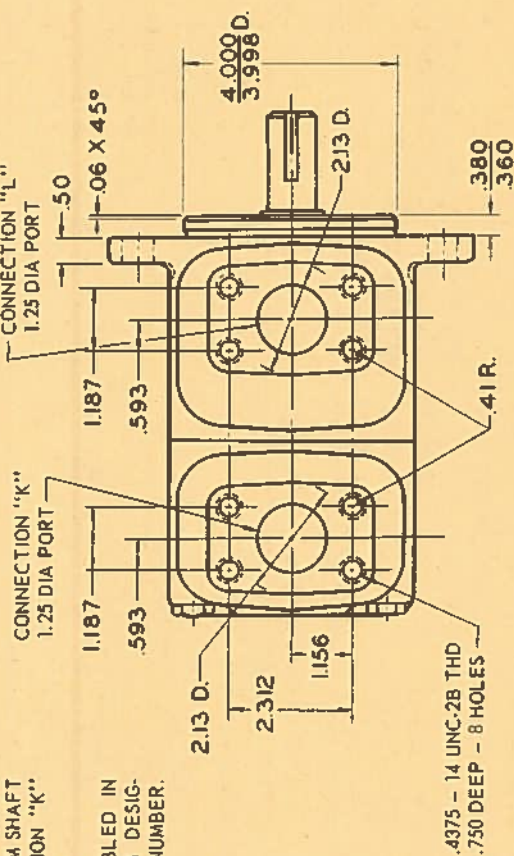
# HIGH PERFORMANCE HYDRAULIC MOTORS

## SERIES 25M (-20 DESIGN) FIXED DISPLACEMENT VANE TYPE

FLUID SUPPLY TO CONNECTION "L" TURNS SHAFT CLOCKWISE AS VIEWED FROM SHAFT END. FLUID SUPPLY TO CONNECTION "K" TURNS SHAFT COUNTERCLOCKWISE.

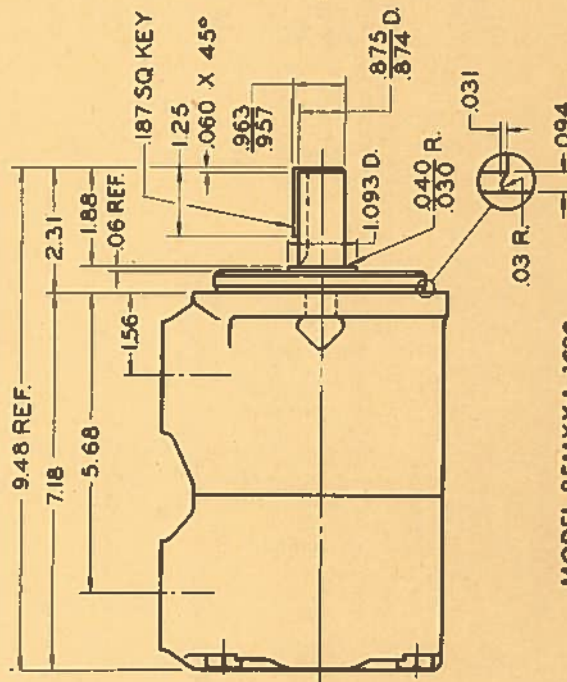
CONNECTION "K," SHOWN ASSEMBLED IN LINE WITH CONNECTION "L," IS DESIGNATED BY LETTER "C" IN MODEL NUMBER.

MODEL NUMBER	TORQUE LB. IN. PER 100 PSI	DISPLACEMENT CU. IN. REV.
25M42A-1C20	42	2.68
25M55A-1C20	55	3.52
25M65A-1C20	65	4.19

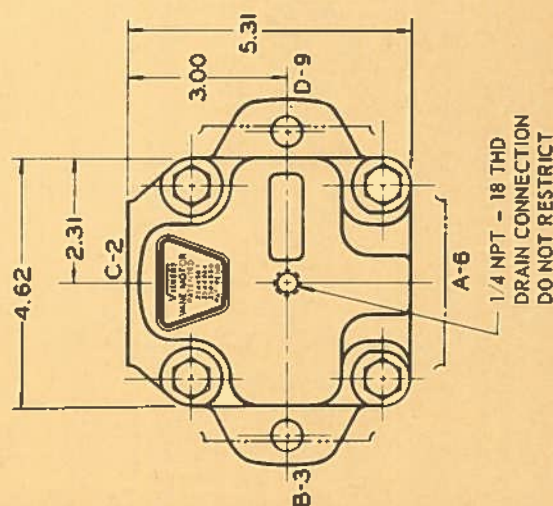


.4375 - 14 UNC-2B THD  
.750 DEEP - 8 HOLES

CLOCKWISE ROTATION



MODEL 25MXXA-1C20  
STANDARD 2-BOLT MOUNTING  
#1 STRAIGHT KEYS



VICKERS DIVISION  
OF SPERRY RAND CORPORATION  
TROY, MICHIGAN 48064

FLUID  
MOTORS

FIXED  
DISPLACEMENT

SERIES 25M  
VANE TYPE

UP TO 73  
OUTPUT  
HORSEPOWER

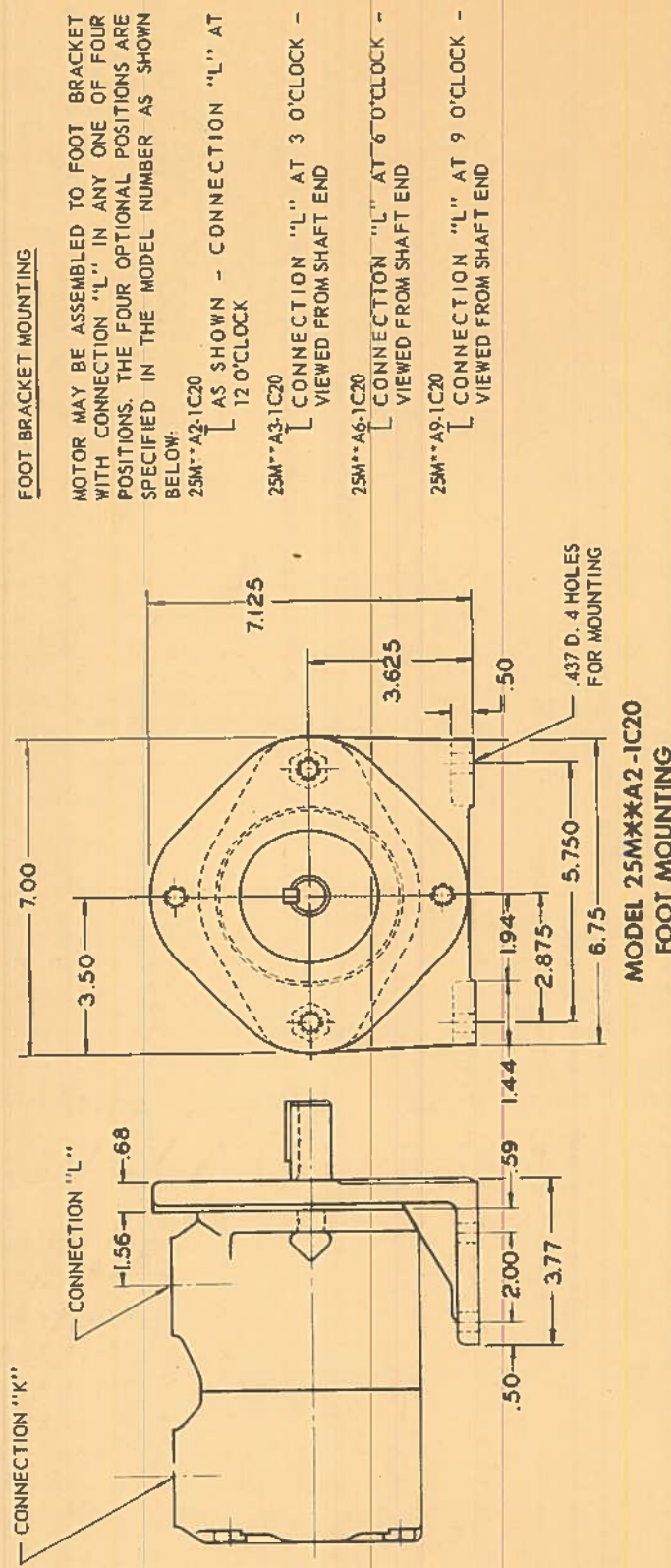
2-BOLT FLANGE  
& FOOT MOUNTING

DWG. NO.  
520140

REVISED 1-3-72



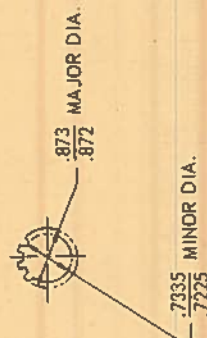
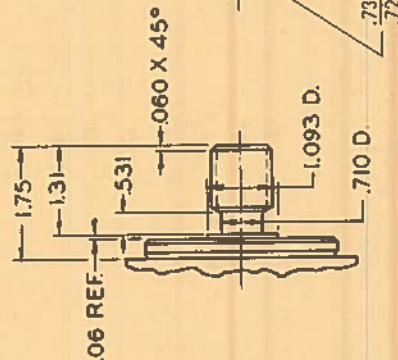
# **VICKERS® HIGH PERFORMANCE HYDRAULIC MOTORS** **SERIES 25M (-20 DESIGN)** **FIXED DISPLACEMENT VANE TYPE**



## **FOOT BRACKET MOUNTING**

MOTOR MAY BE ASSEMBLED TO FOOT BRACKET WITH CONNECTION "L" IN ANY ONE OF FOUR POSITIONS. THE FOUR OPTIONAL POSITIONS ARE SPECIFIED IN THE MODEL NUMBER AS SHOWN BELOW:

- 25M\*\*A2-1C20  
[ AS SHOWN - CONNECTION "L" AT 12 O'CLOCK
- 25M\*\*A3-1C20  
[ CONNECTION "L" AT 3 O'CLOCK - VIEWED FROM SHAFT END
- 25M\*\*A6-1C20  
[ CONNECTION "L" AT 6 O'CLOCK - VIEWED FROM SHAFT END
- 25M\*\*A9-1C20  
[ CONNECTION "L" AT 9 O'CLOCK - VIEWED FROM SHAFT END



SAE INVOLUTE SPLINE DATA  
 FLAT ROOT-MAJOR DIA FIT (MODIFIED OD)  
 16/32 DIAMETRAL PITCH  
 13 TEETH - 30° PRESSURE ANGLE  
 .7493 T.I.F. DIA  
 .8125 PITCH DIA  
 CIR. TOOTH THICKNESS:  
 MAX EFFECTIVE . . . . . .0967  
 MIN EFFECTIVE . . . . . .0953  
 MAX ACTUAL . . . . . .0952  
 MIN ACTUAL . . . . . .0940

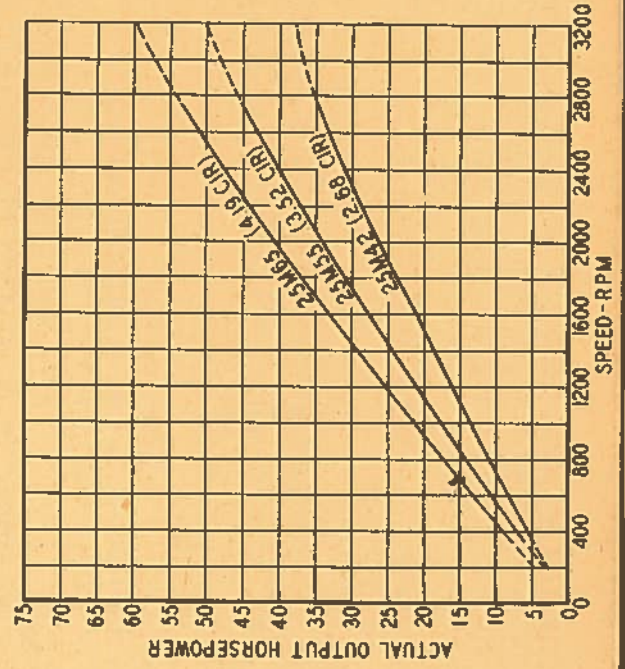
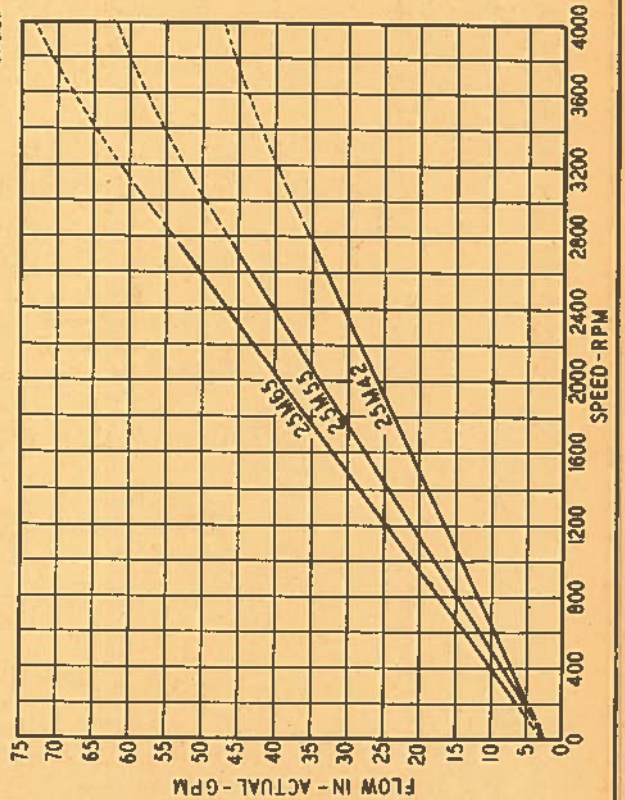
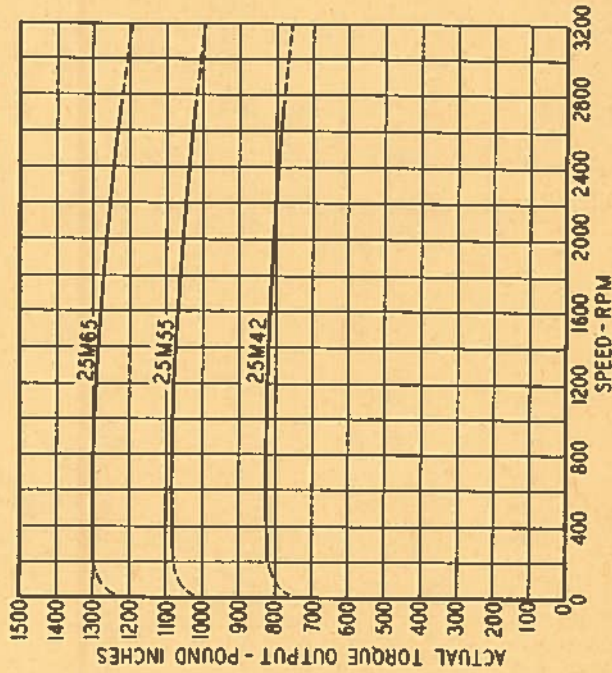
**MODEL 25MXXA2-11X20**  
**# 11 SPLINED SHAFT**



# TYPICAL PERFORMANCE CURVES

OIL TEMPERATURE - 120 F. OIL VISCOSITY - 150 SSU AT 100° F. OPERATING PRESSURE - 2000 PSI  
(DASHED PORTION OF CURVES REPRESENTS INTERMITTENT OPERATION)

## SERIES 25M VANE MOTORS (-20 DESIGN)





# GENERAL DATA:

SERIES 25M MOTORS ARE OF VICKERS BALANCED TYPE CONSTRUCTION. OPERATION MAY BE INTERMITTENT OR CONTINUOUS IN EITHER DIRECTION OF ROTATION. WHEN PROPERLY PROTECTED BY VALVING, MOTORS MAY BE USED FOR CYCLE REVERSING OR STALLED WITHOUT DAMAGE.

## OPERATING SPECIFICATIONS:

### MAXIMUM SPEED AND PRESSURE RATINGS

CONTINUOUS OPERATION		INTERMITTENT OPERATION	
SPEED RPM	PRESSURE PSI	SPEED RPM	PRESSURE PSI
3600	500	4000	500
3300	1000	3800	1000
2800	2000	3200	2000
2600 & LOWER	2250	3000 & LOWER	2500

INTERMITTENT SERVICE EQUALS 10% OF OVERALL TIME. EACH APPLICATION OF PRESSURE AND OR SPEED NOT TO EXCEED OVER 6 SECONDS.

## \* MINIMUM OPERATING SPEED

MINIMUM SPEED IS NORMALLY 100 RPM. LOWER SPEEDS ARE PERMISSIBLE DEPENDING UPON TORQUE REQUIREMENTS AND NATURE OF LOAD.

## CASE DRAIN CONNECTION

A FULL SIZE UNRESTRICTED DRAIN LINE MUST BE CONNECTED DIRECTLY FROM THE CASE DRAIN CONNECTION TO A LOCATION BELOW THE LOWEST FLUID LEVEL IN THE SYSTEM RESERVOIR.

PRESSURE SURGES AT THE DRAIN CONNECTION MAY NOT EXCEED 25 PSI. NOMINAL PRESSURE NOT TO EXCEED 10 PSI. MINIMUM PRESSURE 0 PSI.

RUNNING TORQUE ..... 65% (MINIMUM) OF 400 RPM TORQUE  
STARTING TORQUE

## \* TYPE OF DRIVE

DIRECT DRIVE THROUGH A FLEXIBLE COUPLING IS RECOMMENDED. HOWEVER, BELT, CHAIN, OR GEAR DRIVES CAN BE USED. FOR SPECIFIC RECOMMENDATIONS CONTACT YOUR VICKERS SALES REPRESENTATIVE.

## DRIVE ROTATION

ROTATION CAN BE TO MAXIMUM RPM IN EITHER DIRECTION.

OIL SUPPLY TO CONNECTION "L" TURNS SHAFT CLOCKWISE. OIL SUPPLY TO CONNECTION "K" TURNS SHAFT COUNTERCLOCKWISE.

FILTRATION (MANDATORY) ..... 25 MICRONS OR LESS

## \* FLUID

CLEAN PETROLEUM OIL MEETING OR EXCEEDING LUBRICATING QUALITIES OF SAE 10W MEETING API SERVICE CLASSIFICATION MS (MAXIMUM SEVERITY) IS RECOMMENDED FOR NORMAL INDUSTRIAL HYDRAULIC SYSTEM TEMPERATURES (120°F OPTIMUM). REFER TO DATA SHEET 1-286-S FOR HYDRAULIC OIL RECOMMENDATIONS.

## WEIGHT (APPROX.):

2-BOLT FLANGE MODELS ..... 40 LBS  
FOOT MOUNTING MODELS ..... 53 LBS

\* THIS MOTOR IS DESIGNED TO MEET SPECIFICATIONS AS OUTLINED, TO INSURE MAXIMUM MOTOR PERFORMANCE IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION. CONSULT YOUR VICKERS APPLICATION ENGINEER IF YOUR:

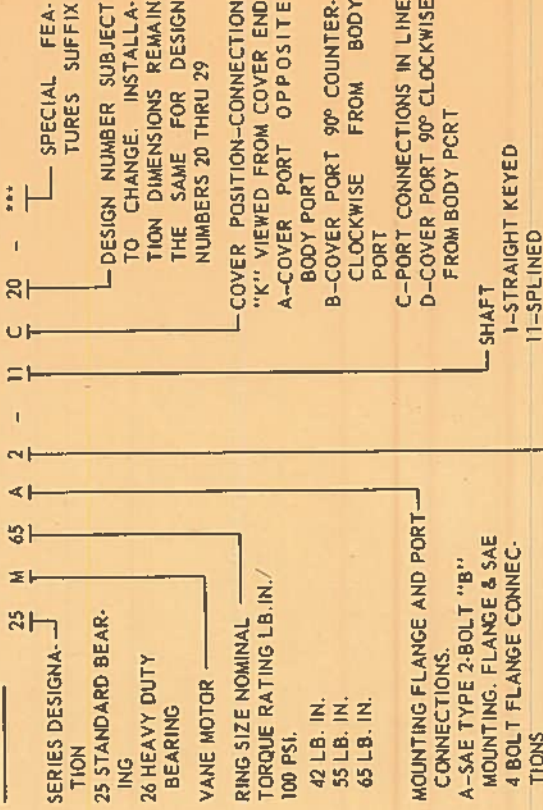
- REQUIRED MINIMUM SPEED IS LESS THAN 100 RPM
- APPLICATION REQUIRES AN INDIRECT DRIVE
- APPLICATION HAS OVERRUNNING LOADS
- APPLICATION REQUIRES BRAKING OR RETARDING
- SYSTEM REQUIRES FIRE RESISTANT FLUID

OIL VISCOSITY AT OPERATING TEMPERATURE IS NOT WITHIN 100 TO 250 SSU

OPERATING TEMPERATURE IS NOT WITHIN 100 TO 150°F. WITH PROPER APPLICATION AND FLUID CONSIDERATION, A GREATER TEMPERATURE RANGE IS PERMISSIBLE

NEEDS REQUIRE APPLICATION ASSISTANCE

## MODEL CODE

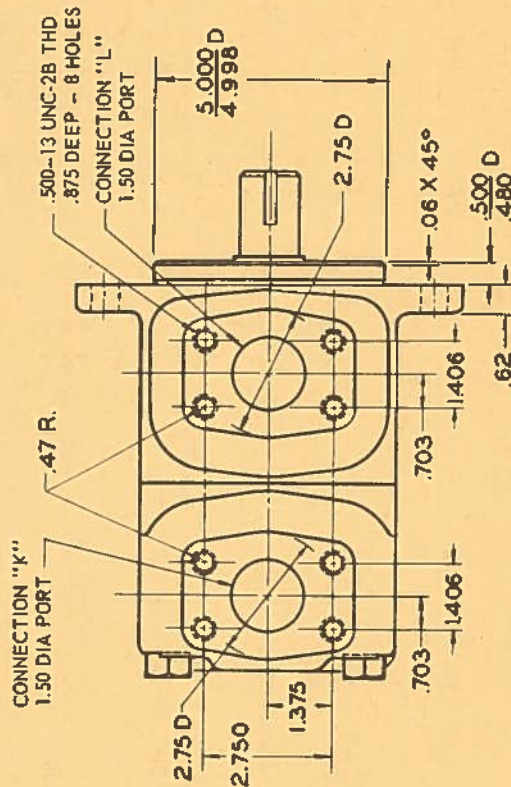




# HIGH PERFORMANCE HYDRAULIC MOTORS

SERIES 35M (-20 DESIGN)

FIXED DISPLACEMENT VANE TYPE



FLUID SUPPLY TO CONNECTION "L" TURNS SHAFT CLOCKWISE AS VIEWED FROM SHAFT END. FLUID SUPPLY TO CONNECTION "K" TURNS SHAFT COUNTERCLOCKWISE.

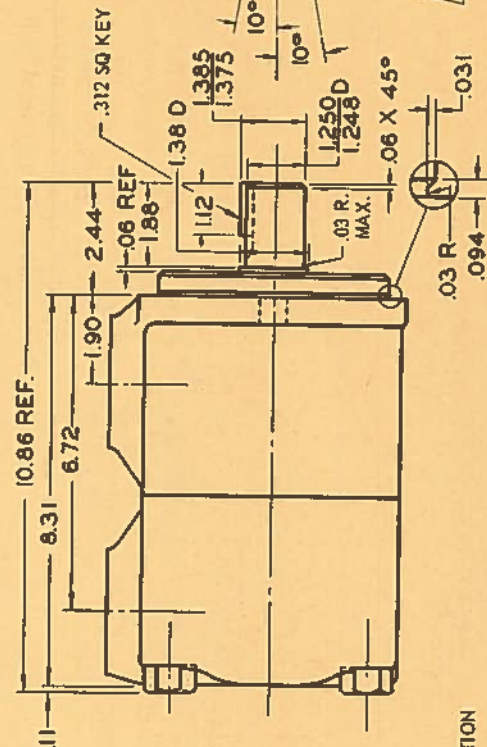
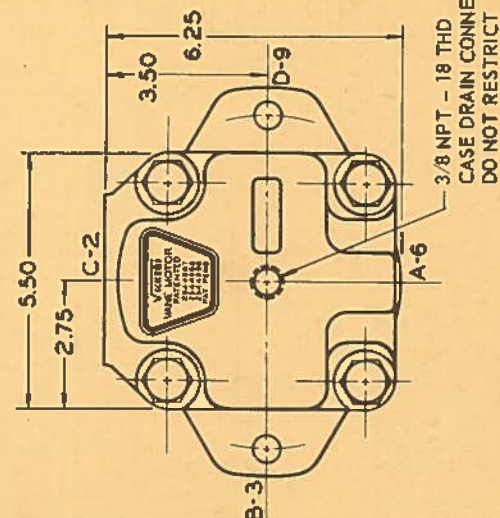
CONNECTION "K," SHOWN ASSEMBLED IN LINE WITH CONNECTION "L," IS DESIGNATED BY LETTER "C" IN MODEL NUMBER.

4-BOLT CONNECTION PADS ARE FOR USE WITH SAE 4-BOLT FLANGES. SEE DRAWING 1-250700 FOR SELECTION.

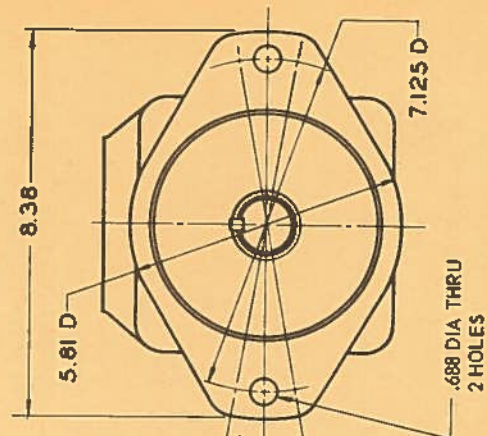
4-BOLT SAE PAD CONNECTIONS WILL ALSO ACCOMMODATE APPROPRIATE 2-BOLT FLANGES.

MODEL NUMBER	TORQUE LB IN. PER 100 PSI	DISPLACEMENT CU IN/REV
35M80A-1C20	80	5.10
35M95A-1C20	95	6.12
35M115A-1C20	115	7.44

"K" AND "L" PORTS ACCEPT VICKERS MODEL FL1-12-12P-10 OR FL1-12-12W-10 FLANGES.



CLOCKWISE ROTATION



MODEL 35MXXXXA-1C20  
STANDARD 2-BOLT MOUNTING  
#1 STRAIGHT KEYED SHAFT

REVISED 3-3-69 R.W.S.

VICKERS DIVISION  
OF SPERRY RAND CORPORATION  
TROY, MICHIGAN

FLUID  
MOTORS

FIXED  
DISPLACEMENT

SERIES 35M  
VANE TYPE

UP TO 131  
OUTPUT  
HORSEPOWER

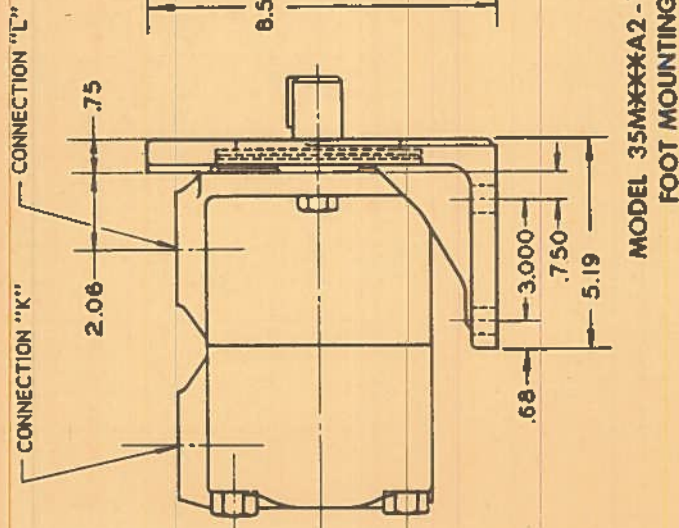
2-BOLT FLANGE  
& FOOT MOUNTING

DWG. NO.  
520150



# HIGH PERFORMANCE HYDRAULIC MOTORS

SERIES 35M (~20 DESIGN)  
FIXED DISPLACEMENT VANE TYPE



MODEL 35MXXXA2-1C20  
FOOT MOUNTING

FOOT BRACKET MOUNTING  
MOTOR MAY BE ASSEMBLED TO FOOT  
BRACKET WITH CONNECTION "L" IN ANY  
ONE OF FOUR POSITIONS. THE FOUR OP-  
TIONAL POSITIONS ARE SPECIFIED IN THE  
MODEL NUMBER AS SHOWN BELOW:

35M\*\*A2-1C20

[AS SHOWN - CONNECTION "L"  
AT 12 O'CLOCK

35M\*\*A3-1C20

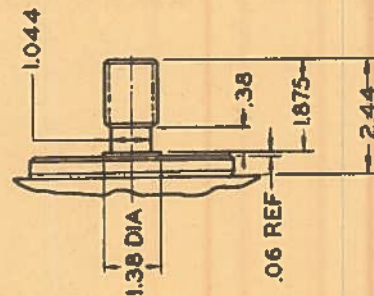
[CONNECTION "L" AT 3 O'CLOCK -  
VIEWED FROM SHAFT END

35M\*\*A6-1C20

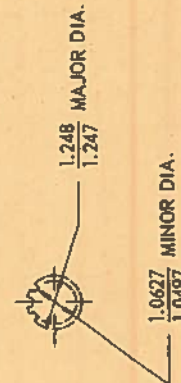
[CONNECTION "L" AT 6 O'CLOCK -  
VIEWED FROM SHAFT END

35M\*\*A9-1C20

[CONNECTION "L" AT 9 O'CLOCK -  
VIEWED FROM SHAFT END



SAE INVOLUTE SPLINE DATA  
FLAT ROOT - MAJOR DIA FIT (MODIFIED OD)  
12/24 DIAMETRAL PITCH  
14 TEETH - 30° PRESSURE ANGLE  
1.0822 T.I.F. DIA  
1.1667 PITCH DIA  
CIR TOOTH THICKNESS:  
MAX EFFECTIVE ..... .1294  
MIN EFFECTIVE ..... .1282  
MAX ACTUAL ..... .1277  
MIN ACTUAL ..... .1265



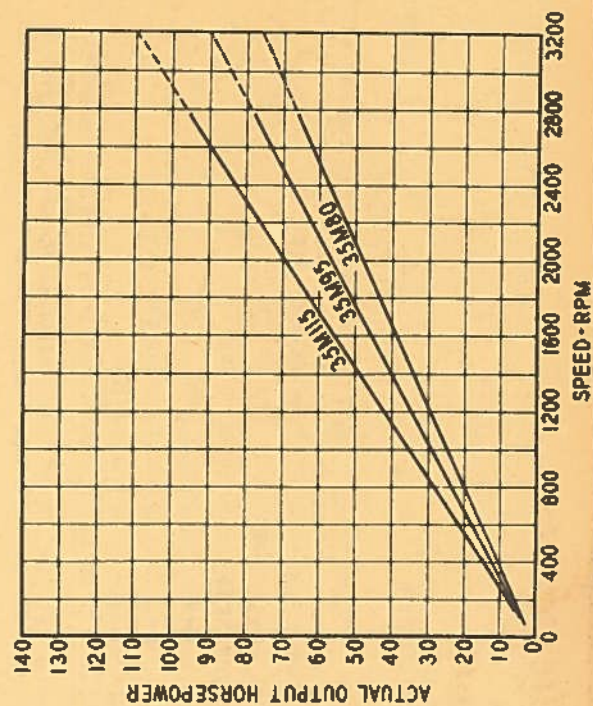
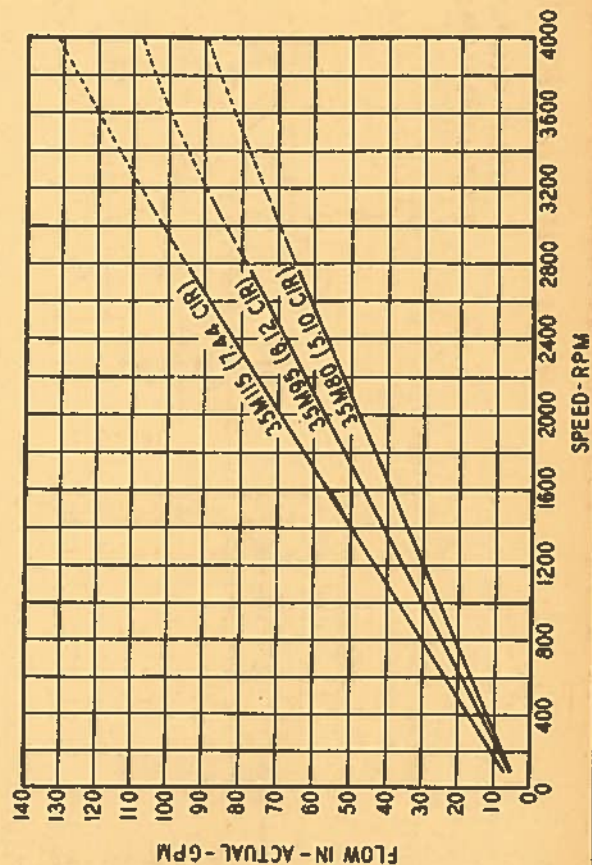
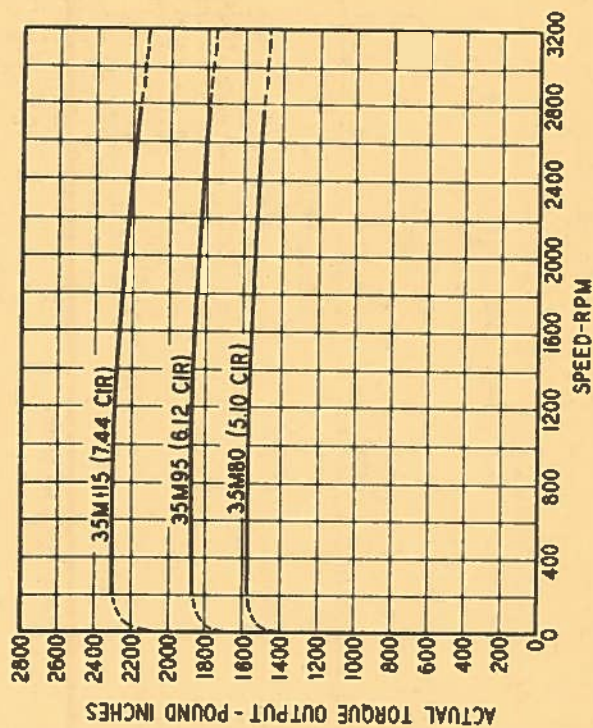
MODEL 35MXXXA2-11X20  
# 11 SPLINED SHAFT



# TYPICAL PERFORMANCE CURVES

OIL TEMPERATURE - 120 F. OIL VISCOSITY - 150 SSU AT 100° F. OPERATING PRESSURE - 2000 PSI  
(DASHED PORTION OF CURVES REPRESENTS INTERMITTENT OPERATION)

## SERIES 35M VANE MOTORS (-20 DESIGN)





**GENERAL DATA:**

SERIES 35M MOTORS ARE OF VICKERS BALANCED TYPE CONSTRUCTION. OPERATION MAY BE INTERMITTENT OR CONTINUOUS IN EITHER DIRECTION OF ROTATION. WHEN PROPERLY PROTECTED BY VALVING, MOTORS MAY BE USED FOR CYCLE REVERSING OR STALLED WITHOUT DAMAGE.

**OPERATING SPECIFICATIONS:**

**MAXIMUM SPEED AND PRESSURE RATINGS**

CONTINUOUS OPERATION		INTERMITTENT OPERATION	
SPEED RPM	PRESSURE PSI	SPEED RPM	PRESSURE PSI
3600	500	4000	500
3300	1000	3800	1000
2800	2000	3200	2000
2600 & LOWER	2250	3000 & LOWER	2500

INTERMITTENT SERVICE EQUALS 10% OF OVERALL TIME. EACH APPLICATION OF PRESSURE AND OR SPEED NOT TO EXCEED OVER 6 SECONDS.

**• MINIMUM OPERATING SPEED**

MINIMUM SPEED IS NORMALLY 100 RPM. LOWER SPEEDS ARE PERMISSIBLE DEPENDING UPON TORQUE REQUIREMENTS AND NATURE OF LOAD.

**CASE DRAIN CONNECTION**

A FULL SIZE UNRESTRICTED DRAIN LINE MUST BE CONNECTED DIRECTLY FROM THE CASE DRAIN CONNECTION TO A LOCATION BELOW THE LOWEST FLUID LEVEL IN THE SYSTEM RESERVOIR.

PRESSURE SURGES AT THE DRAIN CONNECTION MAY NOT EXCEED 25 PSI. NOMINAL PRESSURE NOT TO EXCEED 10 PSI. MINIMUM PRESSURE 0 PSI

RUNNING TORQUE ..... SEE CURVES  
STARTING TORQUE ..... 65% (MINIMUM) OF 400 RPM TORQUE

**• TYPE OF DRIVE**

DIRECT DRIVE THROUGH A FLEXIBLE COUPLING IS RECOMMENDED. HOWEVER, BELT, CHAIN, OR GEAR DRIVES CAN BE USED. FOR SPECIFIC RECOMMENDATIONS CONTACT YOUR VICKERS SALES REPRESENTATIVE.

**DRIVE ROTATION**

ROTATION CAN BE TO MAXIMUM RPM IN EITHER DIRECTION.

OIL SUPPLY TO CONNECTION "L" TURNS SHAFT CLOCKWISE. OIL SUPPLY TO CONNECTION "K" TURNS SHAFT COUNTERCLOCKWISE.

FILTRATION (MANDATORY) ..... 25 MICRONS OR LESS

**• FLUID**

CLEAN PETROLEUM OIL MEETING OR EXCEEDING LUBRICATING QUALITIES OF SAE 10W MEETING API SERVICE CLASSIFICATION MS (MAXIMUM SEVERITY) IS RECOMMENDED FOR NORMAL INDUSTRIAL HYDRAULIC SYSTEM TEMPERATURES (120°F OPTIMUM).

**APPROX. WEIGHT (DRY)**

2-BOLT MOUNTING MODELS ..... 64 LBS  
FOOT MOUNTING MODELS ..... 77 LBS

• THIS MOTOR IS DESIGNED TO MEET SPECIFICATIONS AS OUTLINED. TO INSURE MAXIMUM MOTOR PERFORMANCE IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION, CONSULT YOUR VICKERS APPLICATION ENGINEER IF YOUR:

REQUIRED MINIMUM SPEED IS LESS THAN 100 RPM

APPLICATION REQUIRES AN INDIRECT DRIVE

APPLICATION HAS OVERRUNNING LOADS.

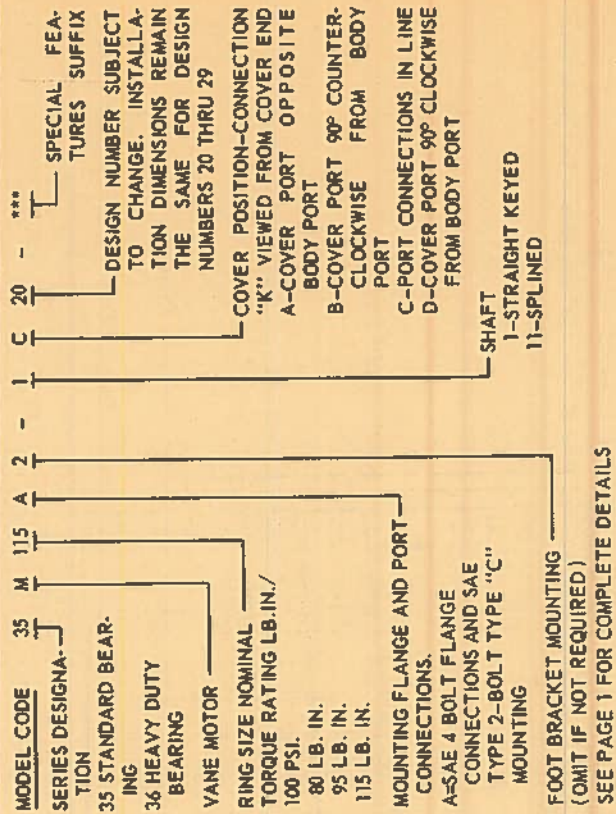
APPLICATION REQUIRES BRAKING OR RETARDING.

SYSTEM REQUIRES FIRE RESISTANT FLUID.

OIL VISCOSITY AT OPERATING TEMPERATURE IS NOT WITHIN 100 TO 250 SSSU

OPERATING TEMPERATURE IS NOT WITHIN 100 TO 150°F. WITH PROPER APPLICATION AND FLUID CONSIDERATION, A GREATER TEMPERATURE RANGE IS PERMISSIBLE.

NEEDS REQUIRE APPLICATION ASSISTANCE.







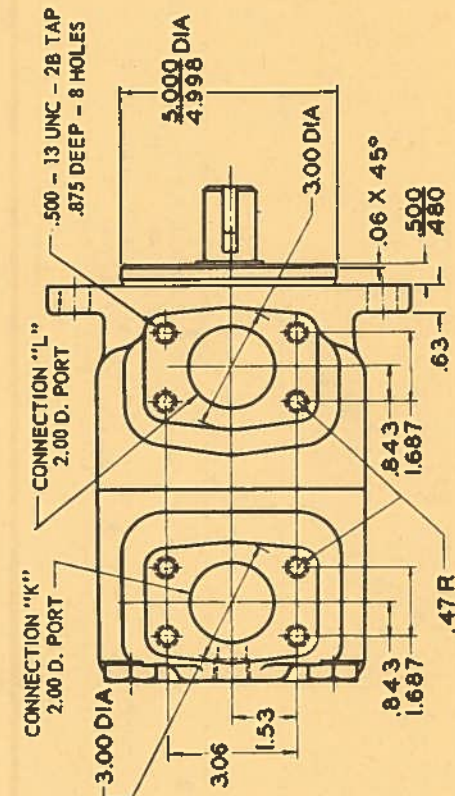
# **VICKERS HIGH PERFORMANCE HYDRAULIC MOTORS** **SERIES 45M (-20 DESIGN)** **FIXED DISPLACEMENT VANE TYPE**

FLUID SUPPLY TO CONNECTION "L" TURNS SHAFT CLOCKWISE AS VIEWED FROM SHAFT END. FLUID SUPPLY TO CONNECTION "K" TURNS SHAFT COUNTERCLOCKWISE.

CONNECTION "K" SHOWN ASSEMBLED IN LINE WITH CONNECTION "L" IS DESIGNATED BY LETTER "C" IN MODEL NUMBER.

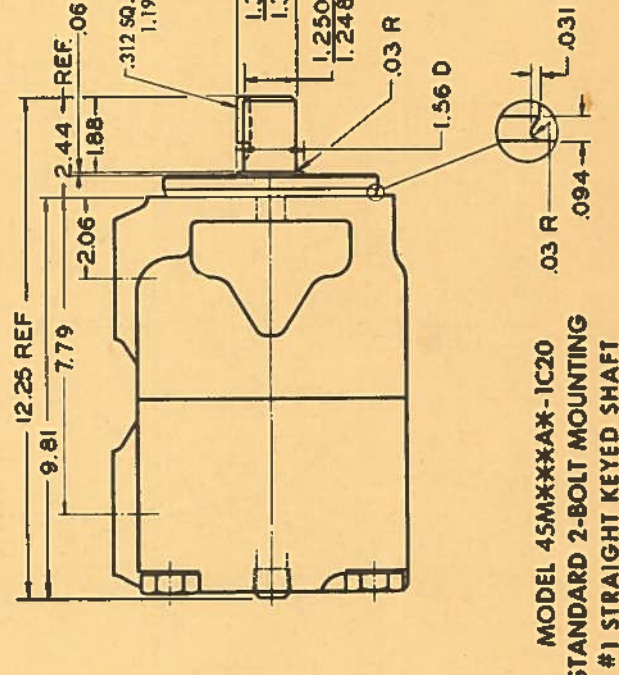
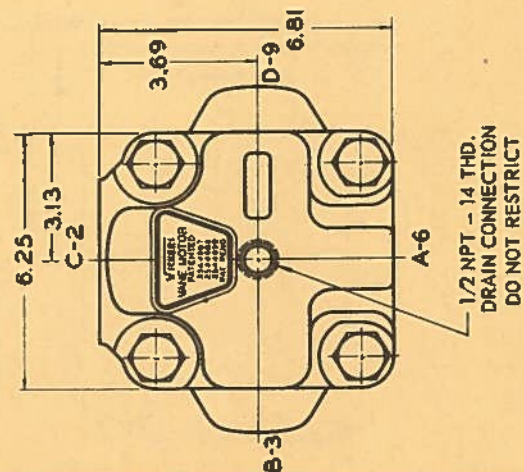
4-BOLT CONNECTION PADS ARE FOR USE WITH SAE 4-BOLT FLANGES. SEE DRAWING I-250700 FOR SELECTION.

4-BOLT SAE PAD CONNECTIONS WILL ALSO ACCOMMODATE APPROPRIATE 2-BOLT FLANGES.

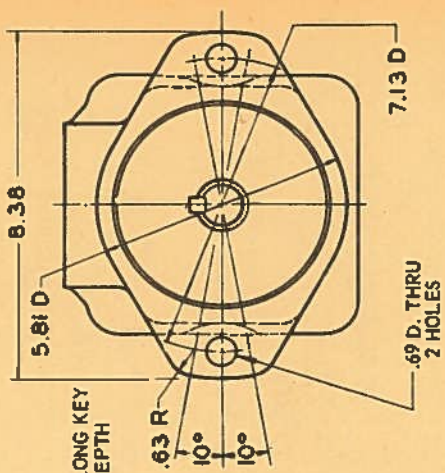


MODEL NUMBER	TORQUE IN. LB PER 100 PSI	DISPLACEMENT CU IN/REV
45M130A-1C20	130	8.42
45M155A-1C20	155	9.96
45M185A-1C20	185	11.79

"K" AND "L" PORTS ACCEPT VICKERS' MODEL FL1-16-16P-10 OR FL1-16-16W-10 FLANGES



CLOCKWISE ROTATION



MODEL 45MXXXXX\*-1C20  
 STANDARD 2-BOLT MOUNTING  
 #1 STRAIGHT KEYED SHAFT

VICKERS DIVISION  
 OF  
 SPERRY RAND CORPORATION  
 TROY, MICHIGAN

FLUID  
 MOTORS

FIXED  
 DISPLACEMENT

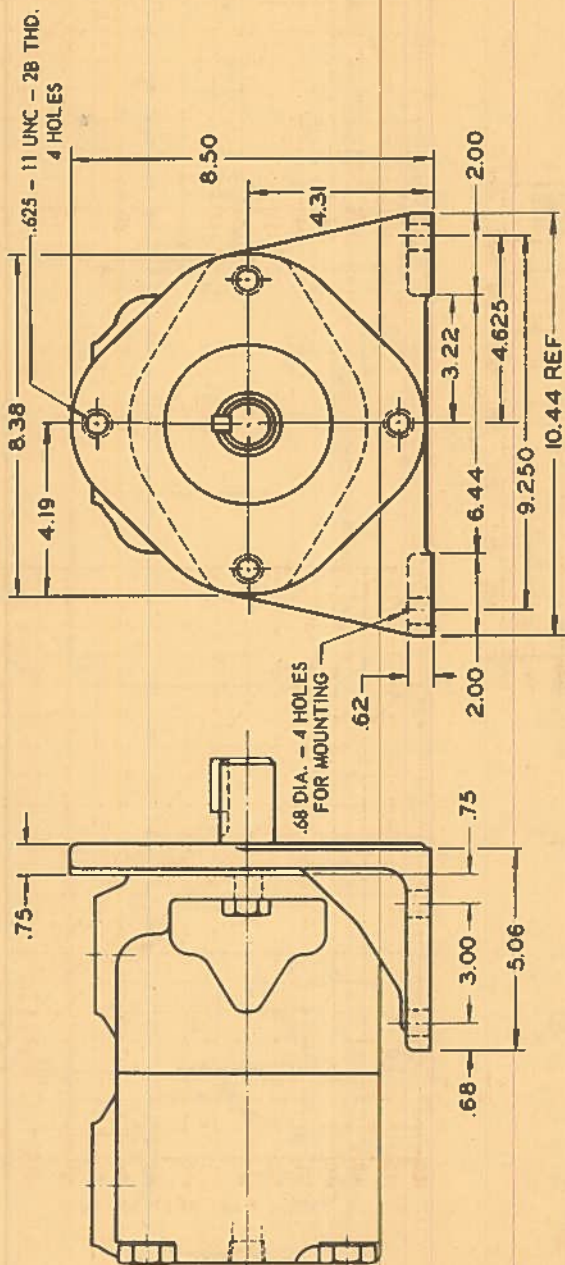
SERIES 45M  
 VANE TYPE

FLANGE &  
 FOOT MOUNTING

DWG. NO.  
 520200



# **VICKERS** HIGH PERFORMANCE HYDRAULIC MOTORS SERIES 45M (-20 DESIGN) FIXED DISPLACEMENT VANE TYPE



## **FOOT BRACKET MOUNTING**

MOTOR MAY BE ASSEMBLED TO FOOT BRACKET WITH CONNECTION "L" IN ANY ONE OF FOUR POSITIONS. THE FOUR OPERATIONAL POSITIONS ARE SPECIFIED IN THE MODEL NUMBER AS SHOWN BELOW:

45M\*\*\*A2-1C20

AS SHOWN - CONNECTION "L" AT 12 O'CLOCK

45M\*\*\*A3-1C20

CONNECTION "L" AT 3 O'CLOCK - VIEWED FROM SHAFT END

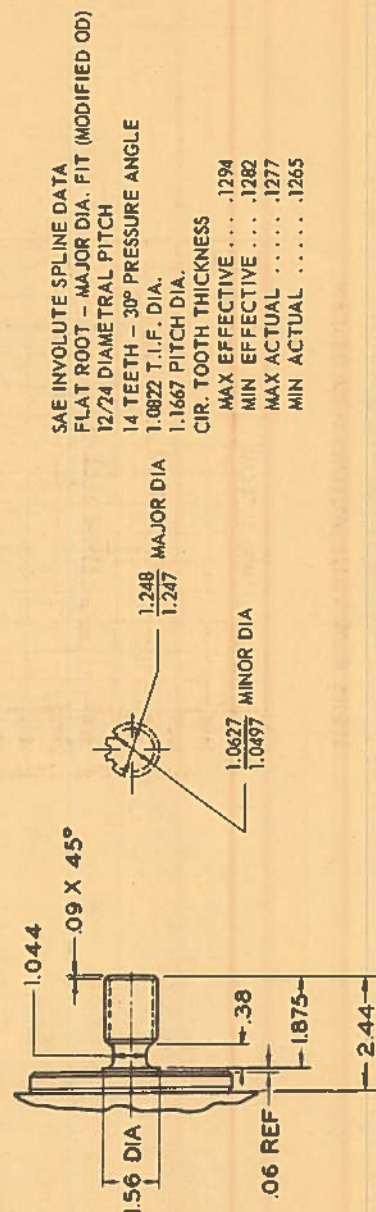
45M\*\*\*A6-1C20

CONNECTION "L" AT 6 O'CLOCK - VIEWED FROM SHAFT END

45M\*\*\*A9-1C20

CONNECTION "L" AT 9 O'CLOCK - VIEWED FROM SHAFT END

## **MODEL 45M\*\*\*A2-1C20 FOOT MOUNTING**



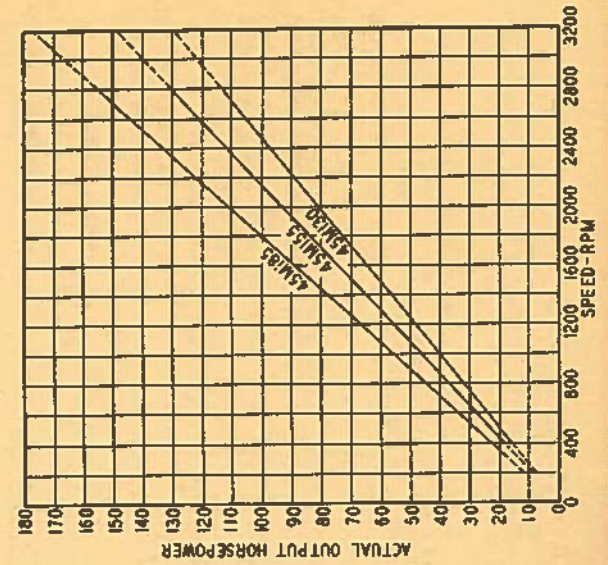
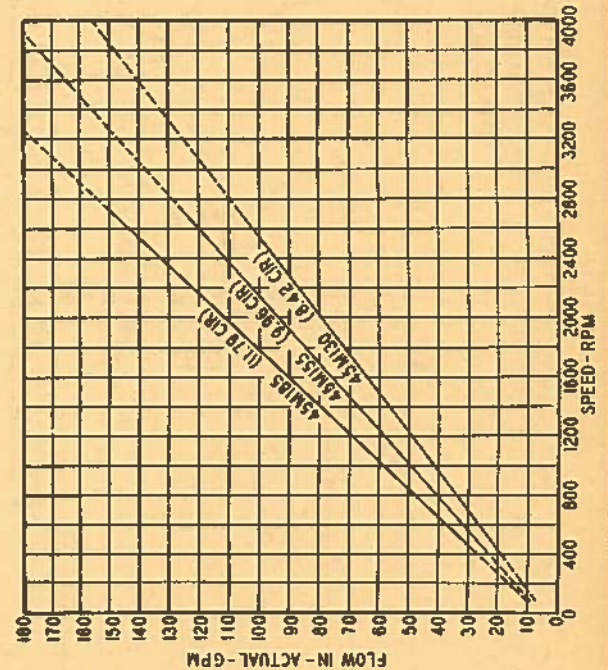
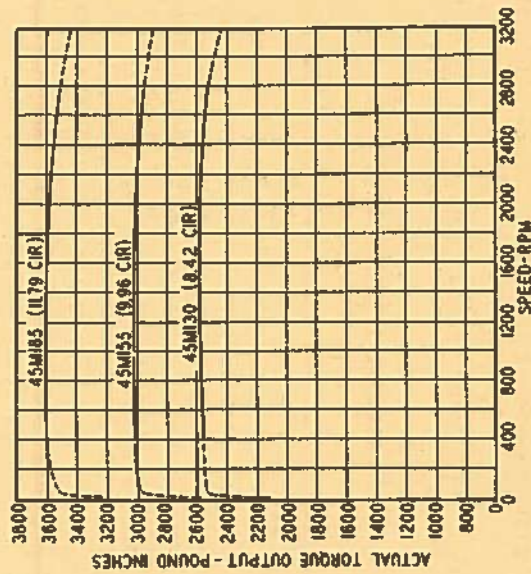
## **MODEL 45M\*\*\*A2-1C20 # 11 SPLINED SHAFT**



# TYPICAL PERFORMANCE CURVES

OIL TEMPERATURE - 120 F. OIL VISCOSITY - 150 SSU AT 100° F. OPERATING PRESSURE - 2000 PSI  
(DASHED PORTION OF CURVES REPRESENTS INTERMITTENT OPERATION)

## SERIES 45M VANE MOTORS (-20 DESIGN)





# GENERAL DATA

SERIES 45M MOTORS ARE OF VICKERS "BALANCED" VANE-TYPE CONSTRUCTION. OPERATION MAY BE INTERMITTENT OR CONTINUOUS IN EITHER DIRECTION OF ROTATION. WHEN PROPERLY PROTECTED BY VALVING, MOTORS MAY BE USED FOR CYCLIC REVERSING OR STALLED WITHOUT DAMAGE.

## OPERATING SPECIFICATIONS

MAXIMUM SPEED AND PRESSURE RATINGS			
CONTINUOUS OPERATION		INTERMITTENT OPERATION	
SPEED- RPM	PRESSURE- PSI	SPEED- RPM	PRESSURE- PSI
3600	500	4000	500
3300	1000	3800	1000
2800	2000	3200	2000
2600 AND LOWER	2250	3000 AND LOWER	2500

A INTERMITTENT SERVICE EQUALS 10% OF OVERALL TIME, EACH APPLICATION OF PRESSURE AND OR SPEED NOT TO EXCEED SIX SECONDS.

## \*MINIMUM OPERATING SPEED

MINIMUM SPEED IS NORMALLY 100 RPM, LOWER SPEEDS ARE PERMISSIBLE DEPENDING UPON TORQUE REQUIREMENTS AND CHARACTERISTICS OF THE DRIVEN LOAD.

## DRAIN LINE

RECOMMENDED MAXIMUM CASE PRESSURE IS:

CONTINUOUS ..... 10 PSI  
INTERMITTENT ..... 25 PSI

RUNNING TORQUE ..... SEE CURVES

STARTING TORQUE ..... 65% (MINIMUM) OF 400 RPM TORQUE

## \*TYPE OF DRIVE

DIRECT DRIVE THROUGH A FLEXIBLE COUPLING IS RECOMMENDED. HOWEVER, BELT, CHAIN OR GEAR DRIVES CAN BE USED. SPECIFIC RECOMMENDATIONS AND DATA ON LIMITATIONS SHOULD BE OBTAINED THROUGH THE VICKERS SALES REPRESENTATIVE.

## DRIVE ROTATION

ROTATION CAN BE TO MAXIMUM RPM IN EITHER DIRECTION.

OIL SUPPLY TO CONNECTION "L" TURNS SHAFT CLOCKWISE. OIL SUPPLY TO CONNECTION "K" TURNS SHAFT COUNTERCLOCKWISE.

FILTRATION (MANDATORY) ..... 25 MICRONS OR LESS

## \*FLUID

CLEAN PETROLEUM OIL MEETING OR EXCEEDING LUBRICATING QUALITIES OF SAE 10W MEETING API SERVICE CLASSIFICATION MS (MAXIMUM SEVERITY) IS RECOMMENDED FOR NORMAL INDUSTRIAL HYDRAULIC SYSTEM TEMPERATURES (120 OPTIMUM).

## APPROX. WEIGHT (DRY)

2 BOLT MTG. MODELS ..... 85 LBS.  
FOOT MTG. MODELS ..... 98 LBS.

\* THIS UNIT IS DESIGNED TO MEET SPECIFICATIONS AS OUTLINED. TO INSURE MAXIMUM UNIT PERFORMANCE IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION, CONSULT YOUR VICKERS APPLICATION ENGINEER IF YOUR:

REQUIRED MINIMUM SPEED IS LESS THAN 100 RPM

APPLICATION REQUIRES AN INDIRECT DRIVE

APPLICATION HAS OVERRUNNING LOADS.

APPLICATION REQUIRES BRAKING OR RETARDING.

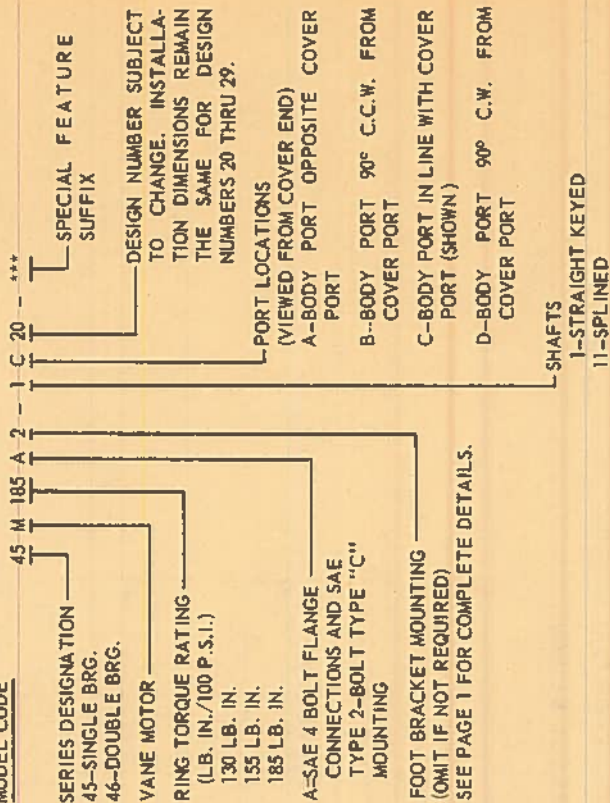
SYSTEM REQUIRES FIRE-RESISTANT FLUID

OIL VISCOSITY AT OPERATING TEMPERATURE IS NOT WITHIN 100 TO 250 SSU

OPERATING TEMPERATURE IS NOT WITHIN 100 F. TO 150 F. WITH PROPER APPLICATION AND FLUID CONSIDERATION, A GREATER TEMPERATURE RANGE IS PERMISSIBLE.

NEEDS REQUIRE APPLICATION ASSISTANCE

## MODEL CODE



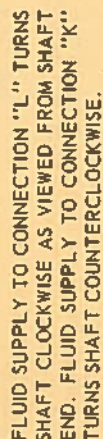


VICKERS®

**SERIES 50M (-20 DESIGN)**

### CONSTANT DISPLACEMENT - VANE TYPE

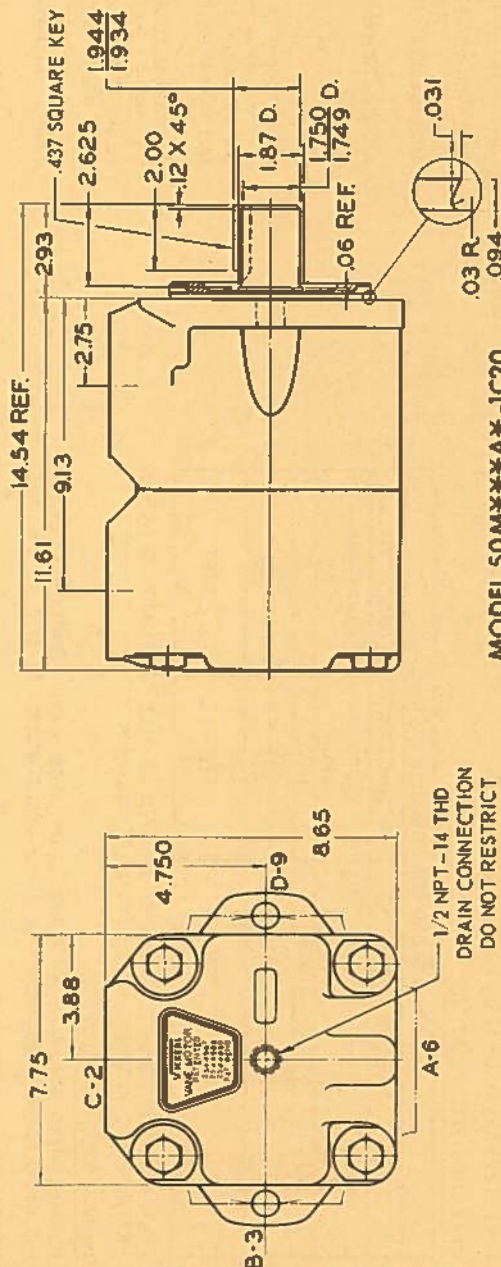
“K” AND “L” PORTS ACCEPT VICKERS MODEL FL1-20-20P-10 OR FL1-20-20W-10 FLANGES.



CONNECTION "K", SHOWN ASSEMBLED IN  
LINE WITH CONNECTION "L," IS DESIG-  
NATED BY LETTER "C" IN MODEL NUMBER.

4-BOLT CONNECTION PADS ARE FOR USE WITH SAE 4-BOLT FLANGES. SEE DRAWING I-250700 FOR SELECTION.

4-BOLT SAE PAD CONNECTIONS WILL ALSO ACCOMMODATE APPROPRIATE 2-BOLT FLANGES.



MODEL 50MXXXAX-1C20  
STANDARD 2-BOLT MOUNTING  
#1 STRAIGHT KEYED SHAFT

REVISÉ 1-3-72

**VICKERS DIVISION**  
**OF SPERRY RAND CORPORATION**  
**TROY, MICHIGAN 48064**

FLUID  
MOTOR

FIXED  
DISPLACEMENT

**SERIES 50M  
VANE TYPE**

**UP TO 230  
OUTPUT  
HORSEPOWER**

2-BOLT  
FLANGE &  
FOOT MOUNTING

DWG. NO.  
520210



# VICKERS® HIGH PERFORMANCE HYDRAULIC MOTORS

SERIES 50M (-20 DESIGN)  
CONSTANT DISPLACEMENT - VANE TYPE

FOOT BRACKET MOUNTING  
MOTOR MAY BE ASSEMBLED TO FOOT BRACKET WITH CONNECTION "L" IN ANY ONE OF FOUR POSITIONS. THE FOUR OPERATIONAL POSITIONS ARE SPECIFIED IN THE MODEL NUMBER AS SHOWN BELOW:

50M\*\*\*A2-1C20

[AS SHOWN - CONNECTION "L" AT 12 O'CLOCK

50M\*\*\*A3-1C20

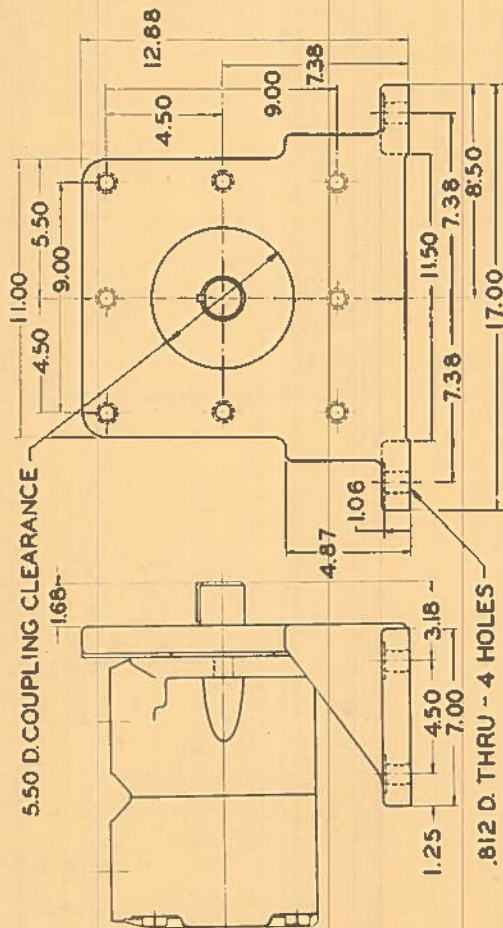
[CONNECTION "L" AT 3 O'CLOCK - VIEWED FROM SHAFT END

50M\*\*\*A6-1C20

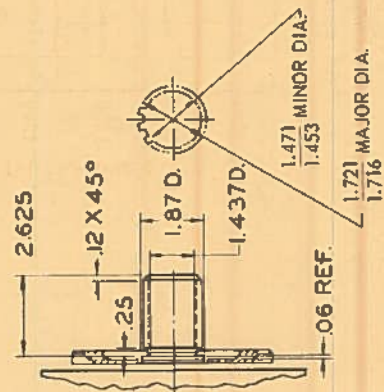
[CONNECTION "L" AT 6 O'CLOCK - VIEWED FROM SHAFT END

50M\*\*\*A9-1C20

[CONNECTION "L" AT 9 O'CLOCK - VIEWED FROM SHAFT END



MODEL 50M\*\*\*A2-1C20  
FOOT MOUNTING



SAE INVOLUTE SPLINE DATA  
FLAT ROOT - MAJOR DIA. FIT (MODIFIED OD)  
8/16 DIAMETRAL PITCH  
13 TEETH-30° PRESSURE ANGLE  
1.5014 T.I.F. DIA.  
1.6250 PITCH DIA.  
CIR. TOOTH THICKNESS:

MAX EFFECTIVE	.1948
MIN EFFECTIVE	.1935
MAX ACTUAL	.1931
MIN ACTUAL	.1918

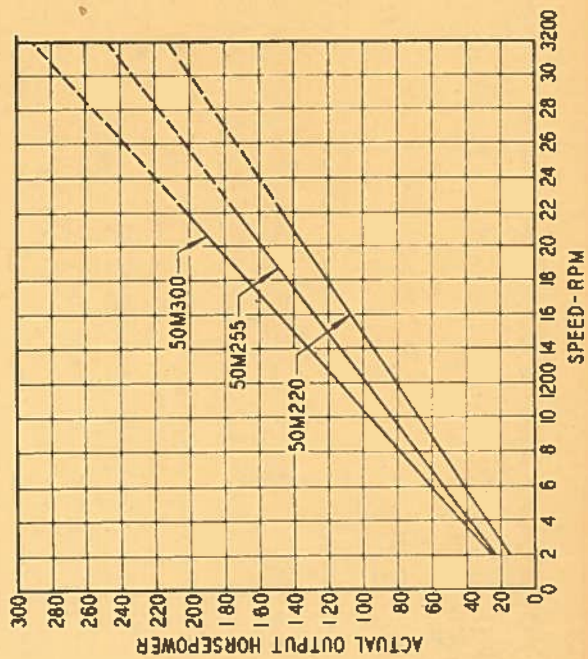
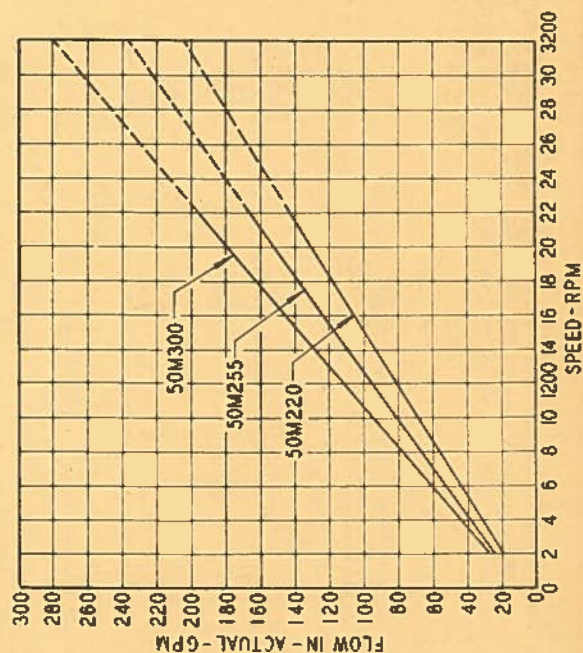
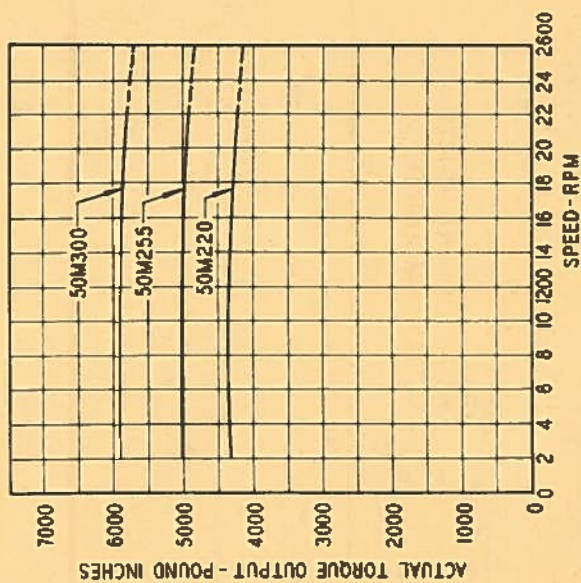
MODEL 50M\*\*\*A2-1C20  
#11 SPLINED SHAFT



# TYPICAL PERFORMANCE CURVES

OIL TEMPERATURE - 120 F. OIL VISCOSITY - 150 SSU AT 100° F OPERATING PRESSURE - 2000 PSI  
(DASHED PORTION OF CURVES REPRESENTS INTERMITTENT OPERATION)

## SERIES 50M VANE MOTORS (-20 DESIGN)





## GENERAL DATA

SERIES 50M MOTORS ARE OF VICKERS "BALANCED" VANE-TYPE CONSTRUCTION. OPERATION MAY BE INTERMITTENT OR CONTINUOUS IN EITHER DIRECTION OF ROTATION. WHEN PROPERLY PROTECTED BY VALVING, MOTORS MAY BE USED FOR CYCLIC REVERSING OR STALLED WITHOUT DAMAGE.

## OPERATING SPECIFICATIONS

MAXIMUM SPEED AND PRESSURE RATINGS

CONTINUOUS OPERATION		INTERMITTENT OPERATION	
SPEED RPM	PRESSURE PSI	SPEED RPM	PRESSURE PSI
2800	500	3200	500
2650	1000	3000	1000
2400	1500		
2250	2000	2600	2000
2200	2250	2400	2250

A INTERMITTENT SERVICE EQUALS 10% OF OVERALL TIME; EACH APPLICATION OF PRESSURE AND/OR SPEED NOT TO EXCEED SIX SECONDS.

## \* MINIMUM OPERATING SPEED

MINIMUM SPEED IS NORMALLY 100 RPM. LOWER SPEEDS ARE PERMISSIBLE DEPENDING UPON TORQUE REQUIREMENTS AND CHARACTERISTICS OF THE DRIVEN LOAD.

## CASE DRAIN CONNECTION

A FULL SIZE UNRESTRICTED DRAIN LINE MUST BE CONNECTED DIRECTLY FROM THE CASE DRAIN CONNECTION TO A LOCATION BELOW THE LOWEST FLUID LEVEL IN THE SYSTEM RESERVOIR.

PRESSURE SURGES AT THE DRAIN CONNECTION MAY NOT EXCEED 25 PSI. NOMINAL PRESSURE NOT TO EXCEED 10 PSI. MINIMUM PRESSURE 0 PSI.

## RUNNING TORQUE

SEE CURVES  
STARTING TORQUE ..... 65% (MINIMUM) OF 400 RPM TORQUE

## \* TYPE OF DRIVE

DIRECT DRIVE THROUGH A FLEXIBLE COUPLING IS RECOMMENDED. HOWEVER, BELT, CHAIN OR GEAR DRIVES CAN BE USED. SPECIFIC RECOMMENDATIONS AND DATA ON LIMITATIONS SHOULD BE OBTAINED THROUGH THE VICKERS SALES REPRESENTATIVE.

## DRIVE ROTATION

ROTATION CAN BE TO MAXIMUM RPM IN EITHER DIRECTION.

OIL SUPPLY TO CONNECTION "L" TURNS SHAFT CLOCKWISE. OIL SUPPLY TO CONNECTION "K" TURNS SHAFT COUNTERCLOCKWISE.

## FILTRATION (MANDATORY)

..... 25 MICRONS OR LESS

## \* FLUID

CLEAN PETROLEUM OIL MEETING OR EXCEEDING LUBRICATING QUALITIES OF SAE 10W MEETING API SERVICE CLASSIFICATION MS (MAXIMUM SEVERITY) IS RECOMMENDED FOR NORMAL INDUSTRIAL HYDRAULIC SYSTEM TEMPERATURES (120° OPTIMUM). REFER TO DATA SHEET L286-S FOR HYDRAULIC OIL RECOMMENDATIONS.

## WEIGHT (APPROX.)

2-BOLT FLANGE MODELS ..... 160 LBS.  
FOOT MTG. MODELS ..... 230 LBS.

\* THIS MOTOR IS DESIGNED TO MEET SPECIFICATIONS AS OUTLINED. TO INSURE MAXIMUM MOTOR PERFORMANCE IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION, CONSULT YOUR VICKERS APPLICATION ENGINEER IF YOUR:

REQUIRED MINIMUM SPEED IS LESS THAN 100 RPM

APPLICATION REQUIRES AN INDIRECT DRIVE

APPLICATION HAS OVERRUNNING LOADS

APPLICATION REQUIRES BRAKING OR RETARDING

SYSTEM REQUIRES FIRE RESISTANT FLUID

OIL VISCOSITY AT OPERATING TEMPERATURE IS NOT WITHIN 100 TO 250 SSU

OPERATING TEMPERATURE IS NOT WITHIN 100 TO 150° F. WITH PROPER APPLICATION AND FLUID CONSIDERATION, A GREATER TEMPERATURE RANGE IS PERMISSIBLE

NEEDS REQUIRE APPLICATION ASSISTANCE

## MODEL CODE

SERIES DESIGNATION

50-SINGLE BRG.

51-DOUBLE BRG.

VANE MOTOR

RING TORQUE RATING

(LB. IN./100 P.S.I.)

220 LB. IN.

255 LB. IN.

300 LB. IN.

PORT CONNECTIONS

A-4 BOLT FLANGE

FOOT BRACKET MOUNTING

(OMIT IF NOT REQUIRED)

SEE PAGE 1 FOR COMPLETE DETAILS.

SHAFTS

1-STRAIGHT KEYED

11-SPLINED

50 M 220 A 2 - 1 C 20 - \*\*\*

SPECIAL FEATURE SUFFIX

DESIGN NUMBER SUBJECT TO CHANGE. INSTALLATION DIMENSIONS REMAIN THE SAME FOR DESIGN NUMBERS 20 THRU 29.

PORT LOCATIONS (VIEWED FROM COVER END)

A-BODY PORT OPPOSITE COVER PORT

B-BODY PORT 90° C.C.W. FROM COVER PORT

C-BODY PORT IN LINE WITH COVER PORT (SHOWN)

D-BODY PORT 90° C.W. FROM COVER PORT



# GENERAL DATA

THE MHT-32 IS A HIGH-TORQUE, LOW-SPEED VANE MOTOR. THIS UNIT IS CAPABLE OF SMOOTH MOTORING SPEEDS THROUGHOUT ITS ENTIRE PRESSURE AND SPEED RANGE. IT WILL PERFORM WELL AT MAXIMUM RATED RPM IN EITHER DIRECTION OF ROTATION.

FLUID TO PORT "B" GIVES CW ROTATION VIEWED FROM PORT "A" END AND TO PORT "A" GIVES CCW ROTATION. IN THE EVENT OF HYDRAULIC SURGE PRESSURES APPLIED TO, OR GENERATED BY, THE MOTOR, RELIEF PROTECTION MUST BE PROVIDED IN THE CIRCUIT TO PREVENT THESE SURGES FROM EXCEEDING THE MAXIMUM PRESSURE RATING. THE INLET MUST BE PROVIDED WITH A SUFFICIENT AMOUNT OF OIL TO PREVENT CAVITATION IN OVERRUNNING LOADS. GENERALLY, BRAKING APPLICATIONS ARE NOT APPROVED; CONSULT YOUR LOCAL SPERRY VICKERS REPRESENTATIVE IF ASSISTANCE IS NEEDED.

## RATINGS

THEORETICAL DISPLACEMENT (REF. 104 GALLONS/REV.)	24.0 CU. IN./REV.
MAXIMUM ROTATING Δ PRESSURE	3000 PSI
MAXIMUM STALL PEAK PRESSURE AND MAXIMUM SUM OF PRESSURE TO BOTH PORTS "A" AND "B" (STALLED)	4000 PSI
MAXIMUM OPERATING SPEED	0 - 275 RPM
@ 3000 Δ PSI (CONTINUOUS)	0 - 400 RPM
THEORETICAL TORQUE/100 Δ PSI (REF. 32 lbf-ft)	384 lbf-in

**SPERRY VICKERS**  
TROY, MICHIGAN 48064

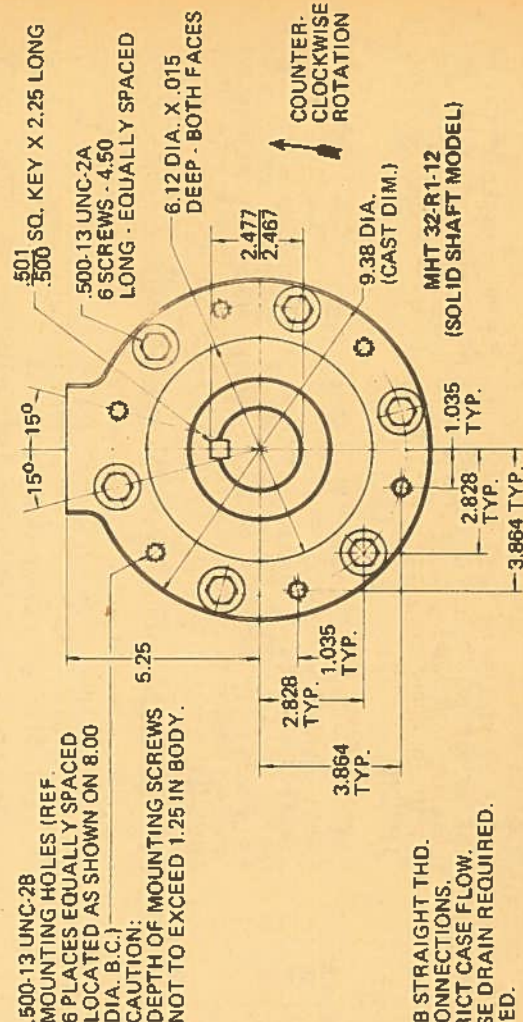
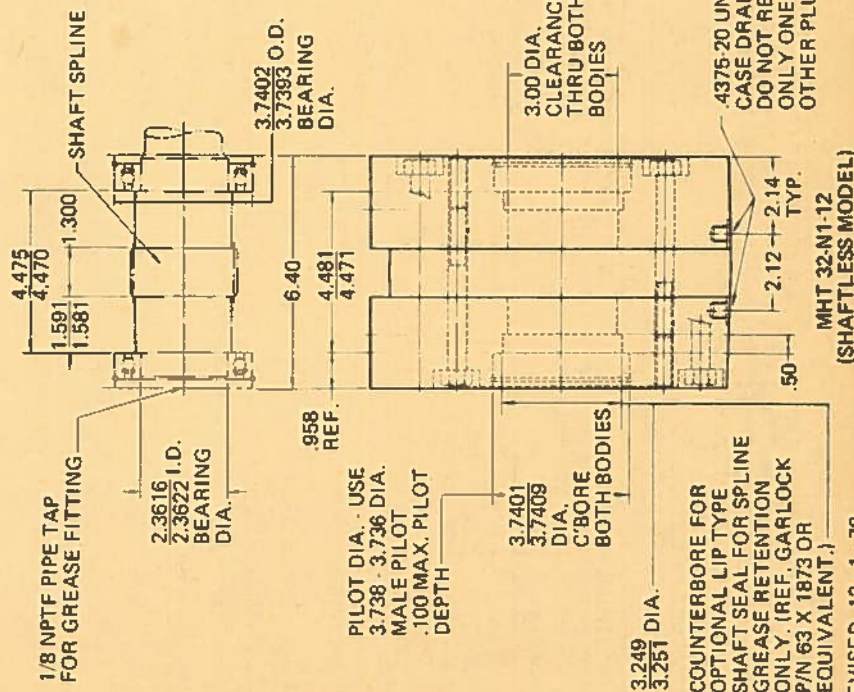
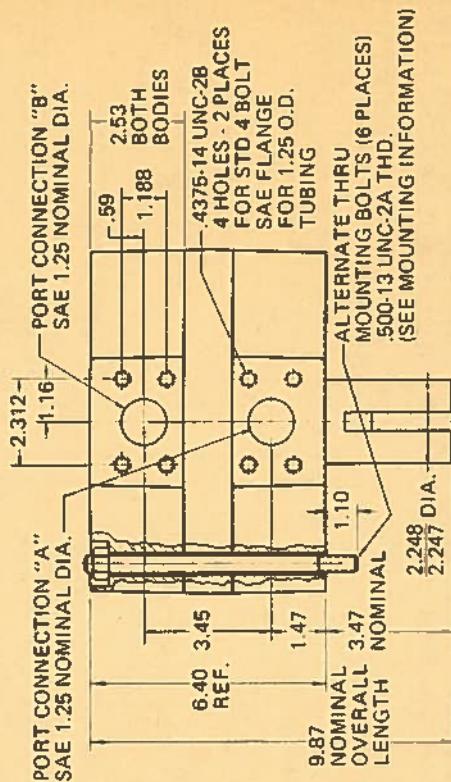
**VANE MOTOR**

**THEORETICAL TORQUE**  
IN. LBS./100 PSI  
384

**THEORETICAL DISPLACEMENT**  
CU. IN./REV.  
24.0

**0 TO 400 RPM**  
SPEED RANGE

**DWG. NO.**  
520220



REVISED 12-1-78

520220



# **MOUNTING AND APPLICATION INFORMATION**

## **MODEL MHT-32-N1-12 - SHAFTLESS**

WITH A SHAFTLESS ASSEMBLY, CUSTOMER SHAFT SHALL PROVIDE ITS OWN BEARINGS, AND CENTER THE ROTOR WITHIN .004 T.I.R. CONCENTRICITY TO THE PILOT DIAMETERS. (SHAFTLESS MODELS HAVE NO BEARINGS.)

CUSTOMER'S SHAFT DESIGN MUST PROVIDE FOR SPLINE GREASE RETENTION. SPLINE IS NOT LUBRICATED BY SYSTEM FLUID. CUSTOMER'S SHAFT NEEDS NO SHAFT SEAL SURFACE FOR SYSTEM FLUID RETENTION.

A SEALING COVER MAY BE MADE FOR SHAFTLESS MODELS (REQUEST DESIGN ASSISTANCE SKETCH 23603 K). USE IN BEARING COUNTERBORE WITH "O" RING 154092 AND SNAP RING 351810 (SEALING COVER NOT MANUFACTURED BY SPERRY VICKERS - FOR CUSTOMER INFORMATION ONLY).

## **SHAFT SPLINE DATA**

### **EXTERNAL INVOLUTE SPLINE**

FILLET ROOT - SIDE FIT  
PITCH DIAMETER - 2.7500 REF.  
BASE DIAMETER - 2.3816 REF.  
NO. OF TEETH - 44  
DIAMETRAL PITCH - 16/32  
PRESSURE ANGLE - 30°  
FORM DIAMETER - 2.6820  
MAJOR DIAMETER - 2.8126/2.8075

WHEN INSTALLING OR DISASSEMBLING A SHAFT, THE SPLINE MUST HAVE A SLIP FIT INTO ROTOR. THERE SHALL BE NO BINDING AND NO AXIAL FORCE APPLIED.

## **MODEL MHT-32-N1 & R1-12**

MOUNTING SURFACE MUST BE FLAT OR CONCAVE SO THAT BODIES ARE NOT FORCED INWARD REMOVING INTERNAL RUNNING CLEARANCE.

HOUSING WILL NOT ACCEPT EXTERNAL AXIAL LOADING EXCEPT AT 8.00 BOLT DIAMETER.

ROTOR WILL NOT TAKE SHAFT TRANSLATION WHILE TORQUING (SLIDING AXIALLY THRU SPLINE).

IF THE SHAFT MUST ABSORB AXIAL FORCES, PRELOADING WILL BE REQUIRED TO PREVENT ANY TRANSLATION. (CONSULT SPERRY VICKERS LOCAL REPRESENTATIVE.)

SHAFT SPLINE SHOULD BE PACKED WITH FIBROUS WHEEL BEARING GREASE AT SIX 1/4" INT. INTERVALS.

SYSTEM CONNECTION PADS ARE FOR USE WITH SAE 4-BOLT FLANGES. REFER TO INSTALLATION DRAWING I-250700 FOR INFORMATION REGARDING SPERRY VICKERS FL1 SERIES SAE 4-BOLT FLANGES.

IF APPLICATION REQUIRES THAT MOUNTING FACE BE SEALED, A SEALING AREA HAS BEEN PROVIDED FOR 6.234 I.D. X .139 CSD "O" RING (SPERRY VICKERS NO. 154112).

MOTORS MAY BE SUPPLIED WITH THREADS DRILLED OUT OF MOUNTING SURFACE BODY FOR THROUGH MOUNTING WITH STANDARD STUDS OR SCREWS, IF REQUIRED. TORQUE TO 90 ± 5 lbf-ft OILED. THRU STUDS NOT INCLUDED. S13 - THREADS DRILLED FROM SHAFT END BODY; S18 - FROM HEAD END BODY.

MOTOR MOUNTING ORIENTATION IS UNRESTRICTED AS TO PORT LOCATION AND MOUNTING FACE. THE SHAFT MAY PROTRUDE FROM EITHER BODY.

## **INSTALLATION**

### **FILTRATION:**

FLUIDS..... 35 MICRONS ABSOLUTE OR FINER  
IT IS GOOD PRACTICE TO LUBRICATE THE INTERNAL PARTS OF THESE NEW UNITS WITH HYDRAULIC FLUID BEFORE START-UP. ADD THE HYDRAULIC FLUID USED TO THE INLET, OUTLET OR CASE OF THE MHT MOTORS PRIOR TO STARTING. FOR MORE COMPLETE INFORMATION ON START-UP, PLEASE CONTACT YOUR LOCAL SPERRY VICKERS REPRESENTATIVE.

# **FLUIDS**

PETROLEUM OILS - ANTIWEAR TYPE INDUSTRIAL HYDRAULIC OILS OR AUTOMOTIVE CRANKCASE OILS HAVING LETTER DESIGNATIONS SC, SD, OR SE. REFER TO DATA SHEET I-286 S FOR FLUID AND TEMPERATURE RECOMMENDATIONS USED WITH INDUSTRIAL MACHINERY.

RUNNING VISCOSITY RANGE 70 TO 250 SUS. OPERATING TEMPERATURE 120° F RECOMMENDED. 180° F USUAL MAXIMUM.

WATER GLYCOLS - SELECT FLUIDS WITH AN OPERATING VISCOSITY OF THE PETROLEUM OIL DESCRIBED ABOVE. RECOMMENDED MAXIMUM TEMPERATURE 130° F. SYNTHETIC FIRE RESISTANT FLUIDS - PHOSPHATE ESTERS AND THEIR BLENDS WITH OPERATING VISCOSITY OF THE PETROLEUM OIL DESCRIBED ABOVE. THESE FLUIDS ARE GENERALLY COMPATIBLE WITH FLUOROCARBON AND SILICONE ELASTOMERS. ADD F3 TO THE MODEL NUMBER.

## **BEARING DATA**

BEARING CAPACITY (RADIAL OR AXIAL)..... 5070 LBS. AFBMA @ 33-1/3 RPM, 500 HOURS B-10 LIFE, 2425 LBS. @ 50 RPM, 15000 HOURS AVERAGE LIFE (UNRELATED TO MOTOR LIFE).

TEMPERATURE: (FLUID AT MOTOR INLET)..... 120° F. TYP. TO 180° F. MAX.  
CASE DRAIN PRESSURE AT THE MOTOR CASE PORT..... 0 TO 25 PSI MAX.  
PERFORMANCE DATA FOR SPECIFIC APPLICATIONS AVAILABLE ON REQUEST FROM YOUR SPERRY VICKERS APPLICATION ENGINEER.

APPROXIMATE INERTIA OF MHT ROTATING GROUP  
WITHOUT SHAFT..... 50 lbf-in<sup>2</sup>  
WITH SHAFT..... 60 lbf-in<sup>2</sup>  
..... 13 lbf-in-SEC.<sup>2</sup>  
..... 16 lbf-in-SEC.<sup>2</sup>

## **CAUTION**

INTERMITTENT (15 MINUTES OR LESS) UNLOADED RUNNING IS PERMITTED AFTER PROPER START AND WARMUP. TO 400 RPM. CASE OUTLET FLOW SHOULD BE UNRESTRICTED AND CHECKED TO ENSURE SOME FLOW. THERE SHOULD BE A MINIMUM OF .05 GPM TOTAL. WHEN MOTOR IS COLD AND OIL IS HOT, START AND STOP MOTOR UNTIL TEMPERATURES ARE EQUALIZED (DO NOT EXCEED 50° F. DIFFERENTIAL).

## **WEIGHT LBS. (APPROX.)**

WITH SHAFT..... 120  
WITHOUT SHAFT..... 105

SPECIAL SEALS  
SEE FLUIDS AND  
SEALS NOTE.

MOTOR

HIGH TORQUE TYPE

MOTOR SIZE - THEORETICAL  
OUTPUT TORQUE lbf-ft/100 PSI

F3 - M HT 32 - R 1 - 12

DESIGN NUMBER  
SUBJECT TO CHANGE. IN-  
STALLATION DIMENSIONS  
REMAIN AS SHOWN FOR DE-  
SIGN NUMBERS 10 THRU 19.

SHAFT VARIATIONS

SHAFT TYPE  
R - SOLID  
N - NONE

## **STANDARD GRAPHICAL SYMBOL**

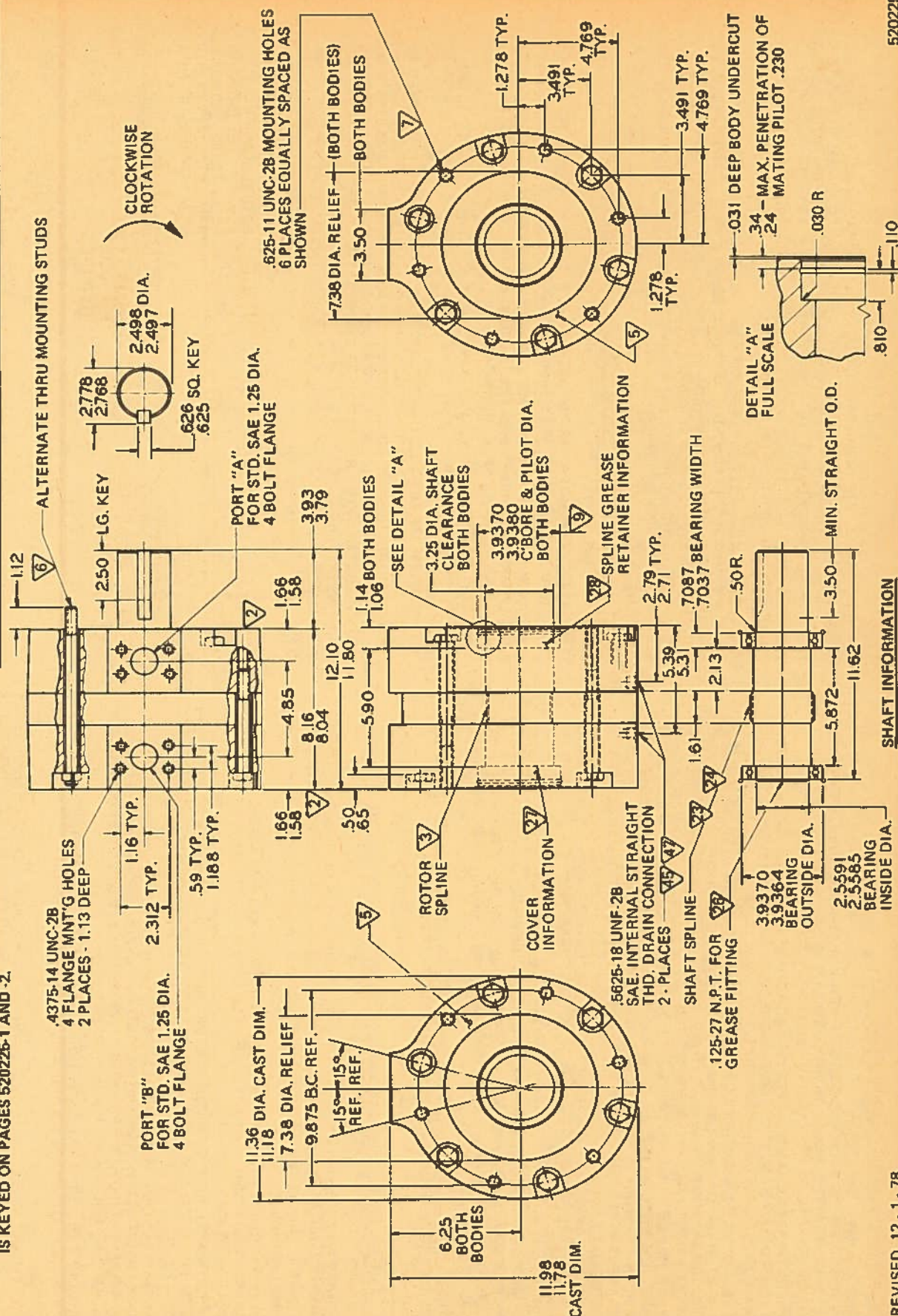




## HYDRAULIC VANE MOTOR

**MODEL SERIES MHT-50.\*-30  
HIGH TORQUE · LOW SPEED  
FIXED DISPLACEMENT**

THE NUMBERED TRIANGLES POINT OUT AREAS OF THE MOTOR WHERE SPECIFIC INFORMATION IS KEYED ON PAGES 520225-1 AND -2.



REVISÉ 12-1-78

## SHAFT INFORMATION

520225



# **GENERAL DATA**

MHT-50-R-30 IS A HIGH TORQUE, LOW-SPEED VANE MOTOR. THIS UNIT IS CAPABLE OF SMOOTH SPEEDS THROUGHOUT ITS ENTIRE PRESSURE AND SPEED RANGE. IT WILL PERFORM EQUALLY WELL IN EITHER DIRECTION OF ROTATION. A SYSTEM RELIEF VALVE IS REQUIRED.

## **ROTATION**

FLUID TO PORT A GIVES CW ROTATION.  
FLUID TO PORT B GIVES CCW ROTATION.

## **RATINGS**

THEORETICAL DISPLACEMENT..... 38 IN.<sup>3</sup>/REV.  
THEORETICAL OUTPUT TORQUE PER 100 PSI DIFFERENTIAL..... 50 LB.-FT.  
CASE DRAIN PORT PRESSURE..... 0 TO 25 PSI MAX.  
SPEED RANGE AT UP TO 3000 PSI DIFFERENTIAL..... 0 TO 200 RPM  
SPEED RANGE AT UP TO 2000 PSI DIFFERENTIAL..... 0 TO 350 RPM  
MAXIMUM PEAK DIFFERENTIAL PRESSURE AT STALL..... 4000 PSI  
MAXIMUM PRESSURE TO INLET OR OUTLET PORT..... 4000 PSI  
MAXIMUM SUM OF PRESSURE AT INLET & OUTLET PORTS..... 4000 PSI

## **BEARING DATA**

BEARING CAPACITY (RADIAL OR AXIAL)..... 5280 LBS. AFBMA @ 33-1/3 RPM,  
500 HOURS 8-10 LIFE, 2525 LBS. @ 50 RPM, 15000 HOURS AVERAGE LIFE  
(UNRELATED TO MOTOR LIFE).

PERFORMANCE DATA FOR SPECIFIC APPLICATIONS AVAILABLE ON REQUEST  
FROM YOUR SPERRY VICKERS APPLICATION ENGINEER.

APPROXIMATE INERTIA OF MHT ROTATING GROUPS

WITHOUT SHAFT.....	145 LB.-IN. <sup>2</sup>	.38 LB.-IN.-SEC. <sup>2</sup>
WITH SHAFT.....	162 LB.-IN. <sup>2</sup>	.42 LB.-IN.-SEC. <sup>2</sup>

## **BRAKING**

THIS MOTOR MAY BE USED AS A BRAKE AT ANY SPEED AND PRESSURE PERMISSIBLE BY MOTOR RATINGS.

## **CONVERSION**

A BASIC MHT-50-R1-30 BECOMES A MHT-50-N1-30 BY OMITTING TWO BEARINGS 379974, TWO SNAP RINGS 380104, AND SHAFT 380094.

## **WEIGHT LBS. (APPROX.)**

WITHOUT SHAFT.....	180
WITH SHAFT.....	200

## **MOUNTING**

1. MOTOR HOUSING WILL ACCEPT NO AXIAL LOADING EXCEPT AT 9.875 BOLT CIRCLE.

2. CUSTOMER MOUNTING SURFACE SHALL BE FLAT WITHIN .001 IN. AND PERPENDICULAR TO AXIS WITHIN .001 TIR.

3. THE SPLINED ROTOR WILL NOT ACCEPT ANY SHAFT-TRANSLATION, (SLIDING AXIALLY THRU SPLINE).

4. IF THE SHAFT MUST ABSORB AXIAL FORCES, PRELOADING WILL BE REQUIRED TO PREVENT ANY TRANSLATION. CONSULT SPERRY VICKERS APPLICATION ENGINEER.

5. IF THE APPLICATION REQUIRES THE MOUNTING FACE TO BE SEALED, AN AREA HAS BEEN PROVIDED FOR USE WITH A 7.75 I.D. "O" RING SUCH AS SPERRY VICKERS 192412.

6. MOTORS MAY BE SUPPLIED WITH THREADS DRILLED OUT OF MOUNTING SURFACE BODY FOR THROUGH MOUNTING WITH STANDARD STUDS OR SCREWS. IF REQUIRED, TORQUE TO 125 ±5 LB. FT. OILED. THRU STUDS NOT INCLUDED. S13 - THREADS DRILLED FROM SHAFT END BODY; S18 - FROM HEAD END BODY.

7. CONVENTIONAL MOUNTING IS WITH SIX SCREWS THRU BACK OF MOUNTING PLATE, 1.75 MAX. INTO MOTOR. TORQUE TO 60-70 LB.-FT. OILED.

8. MOTOR MOUNTING ORIENTATION IS UNRESTRICTED.

9.

PILOT MUST BE A NONBINDING SLIP FIT, AND SHALL NOT EXCEED .230 MAX. INTO MOTOR.

## **SHAFT DATA**

22. SHAFT DESIGN MUST PROVIDE SPLINE GREASE RETENTION. SPLINE IS NOT LUBRICATED BY SYSTEM FLUID. CUSTOMER SHAFT NEEDS NO SHAFT SEAL SURFACE FOR SYSTEM FLUID RETENTION.

23.

SHAFT SPLINE MUST SLIP FIT INTO ROTOR.

## **SHAFT DATA -**

EXTERNAL INVOLUTE SPLINE  
FILLET ROOT - SIDE FIT  
PITCH DIAMETER - 3.0000 REF.  
BASE DIAMETER - 2.5981 REF.  
NO. OF TEETH - 48  
DIAMETRAL PITCH - 16/32  
PRESSURE ANGLE - 30°  
FORM DIAMETER - 2.9315  
MAJOR DIAMETER - 3.0625/3.0675  
MINOR DIAMETER - 2.8750/2.8840

FILLET RADII - .020 REF.  
CIRCULAR TOOTH THICKNESS - .0943 MAX. ACT. REF.  
.0929 MIN. ACT.  
.0962 MAX. EFF.  
.0948 MIN. EFF. REF.

MEASUREMENT OVER .1200 DIA. PINS  
3.1814 REF. MAX.  
3.1791 REF. MIN.

24.

WHEN DISASSEMBLING OR INSTALLING A SHAFT, THERE SHALL BE NO BINDING AND NO AXIAL FORCE APPLIED.

25.

WITH A SHAFTLESS ASSEMBLY, THE CUSTOMER SHAFT SHALL PROVIDE ITS OWN BEARINGS, AND CENTER THE ROTOR WITH .004 TIR CONCENTRICITY TO THE PILOT DIAMETERS.

26.

THE SHAFT SPLINE SHOULD BE PACKED WITH FIBROUS WHEEL-BEARING GREASE AT SIX MONTH INTERVALS, OR SOONER IF OPERATION IS AT HIGH TEMPERATURE. A STANDARD 1/8 NPT GREASE FITTING MAY BE INSTALLED AT THE END OF THE SHAFT FOR THIS PURPOSE. (NOT SUPPLIED).

27.

A COVER MAY BE MADE TO SEAL OFF SHAFTLESS MODELS AT THIS LOCATION. SEE DESIGN ASSISTANCE SKETCH 23511-K. THE COVER HAS PROVISION FOR A 1/8 NPT GREASE FITTING. USE WITH "O" RING 154094 AND SNAP RING 380104 OR EQUIVALENT. (COVER 23511-K NOT MANUFACTURED BY SPERRY VICKERS - FOR CUSTOMER INFORMATION ONLY.)

28.

IF CUSTOMER INSTALLATION USES NO BEARINGS IN THE MOTOR, SPLINE GREASE RETENTION MAY BE OBTAINED BY USING A SHAFT SEAL ADAPTER MOUNTED IN THE BEARING BORE WITH "O" RING 154094 AND SNAP RING 380104 OR EQUIVALENT. SEE DESIGN ASSISTANCE SKETCH 23512-K FOR ADAPTER. SUGGESTED SHAFT SEAL SIZE IS 2.53 I.D. (ADAPTER NOT MANUFACTURED BY SPERRY VICKERS - FOR CUSTOMER INFORMATION ONLY).

41.

FLUIDS  
PETROLEUM OILS - ANTIWEAR TYPE INDUSTRIAL HYDRAULIC OILS OR AUTOMOTIVE CRANKCASE OILS HAVING LETTER DESIGNATIONS SC, SD, OR SE (SEE DATA SHEET 1-286-S).

RUNNING VISCOSITY RANGE 70 TO 250 SUS. OPERATING TEMPERATURE 120° F RECOMMENDED, 180° F USUAL MAXIMUM.

FOR DETAILS, SEE HYDRAULIC OIL RECOMMENDATIONS FOR INDUSTRIAL MACHINERY, DATA SHEET 1-286-S IN SECTION L OF CATALOGUE.

WATER GLYCOLS - SELECT FLUIDS WITH AN OPERATING VISCOSITY OF THE PETROLEUM OIL DESCRIBED ABOVE. RECOMMENDED MAXIMUM TEMPERATURE 130° F.

SYNTHETIC FIRE RESISTANT FLUIDS - PHOSPHATE ESTERS AND THEIR BLENDS WITH OPERATING VISCOSITY OF THE PETROLEUM OIL DESCRIBED ABOVE. THESE FLUIDS ARE GENERALLY COMPATIBLE WITH FLUORO-CARBON AND SILICONE ELASTOMERS. ADD F3 TO THE MODEL NUMBER.



# SPERRY-VICKERS HYDRAULIC VANE MOTOR

MODEL SERIES MHT-50 • 30  
HIGH TORQUE - LOW SPEED  
FIXED DISPLACEMENT

## CIRCUIT

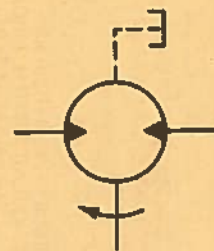
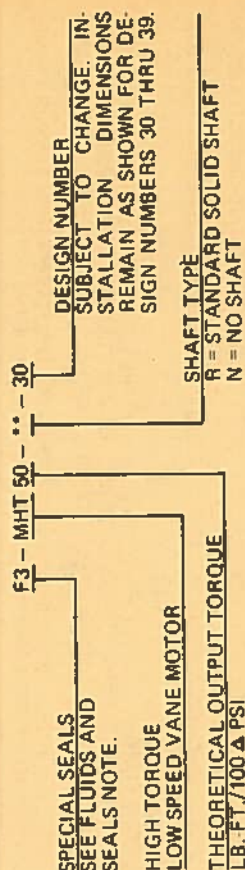
42. FLUID TEMPERATURE. . . . . 120° F. TYP. TO 180° F. MAX.
43. FLUID FILTRATION. . . . . 35 MICRONS ABSOLUTE OR FINER
44. CIRCUIT DESIGN SHOULD PROTECT MOTOR FROM PRESSURE SURGES AND/OR CAVITATION.
45. DRAIN OUTLET FLOW LINE MUST BE UNRESTRICTED AND SIZED SUCH THAT CASE PRESSURE AT MOTOR NEVER EXCEEDS RATINGS. EITHER DRAIN OUTLET MAY BE USED; LEAVE OTHER PLUGGED. CONNECT BELOW OIL LEVEL.
46. INTERMITTENT (15 MINUTES OR LESS) UNLOADED RUNNING IS PERMITTED AFTER PROPER START AND WARM UP, TO 200 RPM.
47. CASE OUTLET FLOW MUST BE CHECKED FOR MINIMUM OF .05 GPM. IF NECESSARY, CASE FLOW MAY BE INCREASED BY BACK PRESSURE AT THE MOTOR OUTLET PORT.
48. THERMAL SHOCKS IN EXCESS OF 50°F. ARE NOT RECOMMENDED. WHEN MOTOR IS COLD AND OIL IS HOT, START AND STOP MOTOR UNTIL TEMPERATURES ARE EQUALIZED. FOR MORE COMPLETE INFORMATION ON START-UP, PLEASE CONTACT YOUR LOCAL SPERRY VICKERS REPRESENTATIVE.

## NOTE:

IT IS GOOD PRACTICE TO LUBRICATE THE INTERNAL PARTS OF THESE NEW UNITS WITH HYDRAULIC FLUID BEFORE START-UP. ADD THE HYDRAULIC FLUID USED, TO THE INLET, OUTLET, OF THE MHT MOTORS PRIOR TO STARTING.

MOTOR MOUNTING ORIENTATION IS UNRESTRICTED AS TO PORT LOCATION AND MOUNTING FACE. THE SHAFT MAY PROTRUDE FROM EITHER BODY.

## MODEL CODE



STANDARD GRAPHICAL SYMBOL  
FOR FLUID POWER DIAGRAMS



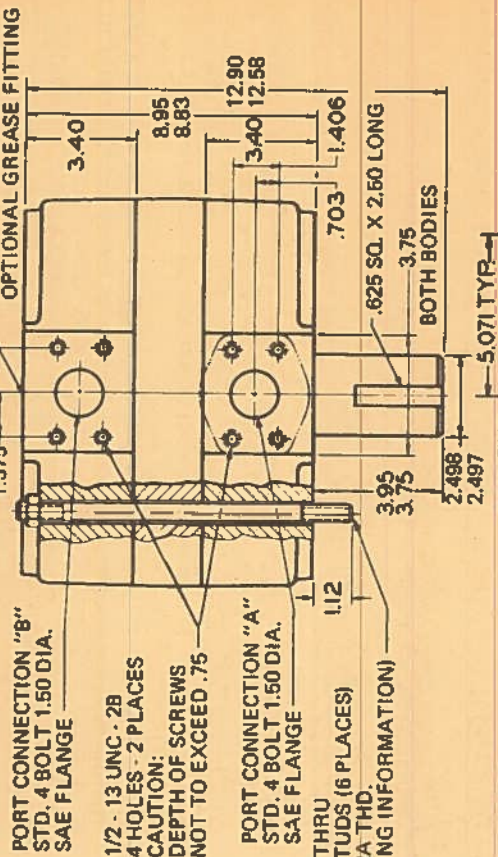
# SPERRY VICKERS

## HYDRAULIC VANE MOTORS

MODEL SERIES MHT-70 AND MHT-90  
HIGH TORQUE - LOW SPEED  
FIXED DISPLACEMENT

.34/.24 - MAX. PENETRATION  
OF MATING PILOT: .230

.03 MIN. DEEP  
BODY U' CUT



.625-11 UNC - 28 THD.  
MOUNTING HOLES 6 PLACES  
EQUALLY SPACED AS  
SHOWN. TORQUE MTG.  
SCREWS TO 60-70 LB.-FT. OILED

CAUTION:  
DEPTH OF MOUNTING  
SCREWS SHALL NOT  
EXCEED 1.75 INTO BODY

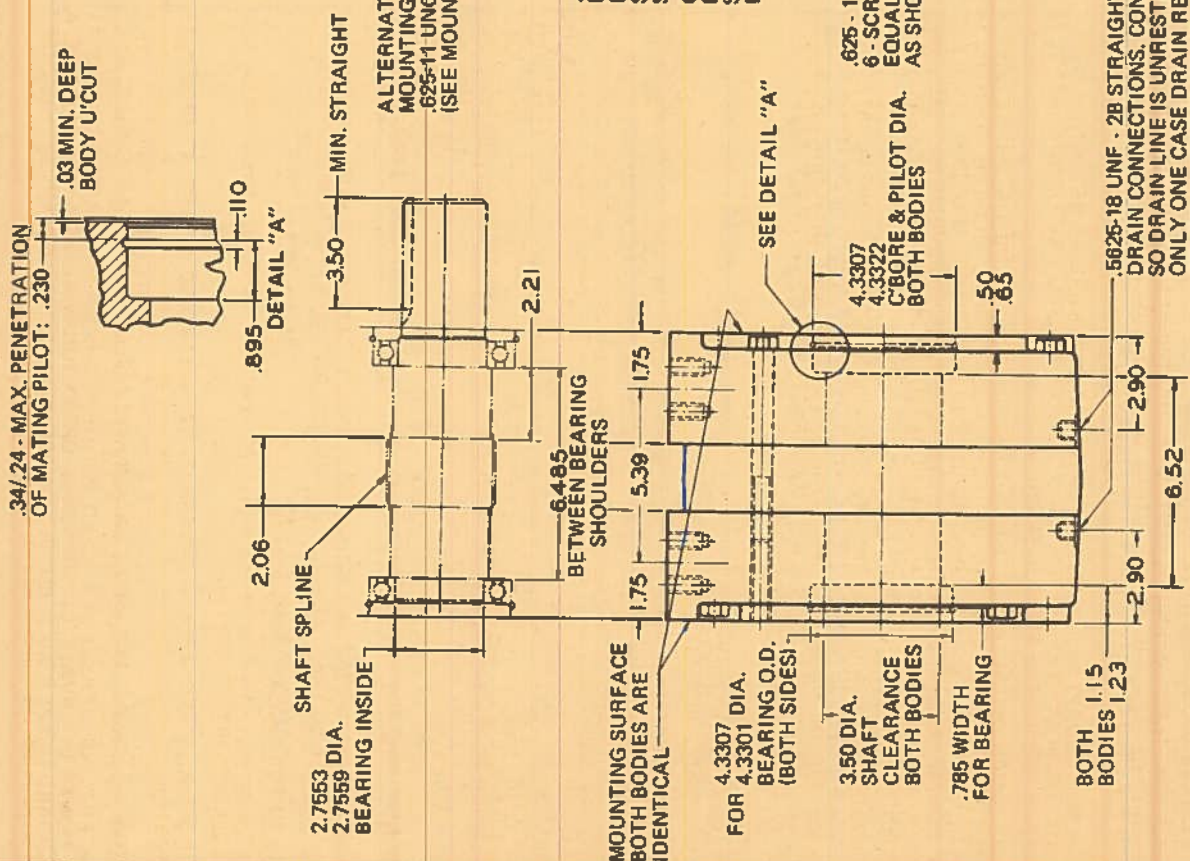
CAST DIMENSION 12.15  
12.35

.625-11 UNC - 2A THD.  
6 - SCREWS - 6.00 LONG  
EQUALLY SPACED LOCATED  
AS SHOWN

COUNTERCLOCKWISE  
ROTATION

CLOCKWISE  
ROTATION

.5625-18 UNF - 28 STRAIGHT THD.  
DRAIN CONNECTIONS. CONNECT  
SO DRAIN LINE IS UNRESTRICTED.  
ONLY ONE CASE DRAIN REQUIRED.  
OTHER MAY BE PLUGGED.  
(SEE NOTES)



REVISED 12 - 1 - 78

520230

SPERRY VICKERS  
TROY, MICHIGAN 48084

VANE  
MOTOR

THEORETICAL TORQUE  
IN. LBS./100 PSI  
MHT-70 840  
MHT-90 1080

THEORETICAL DISPLACEMENT  
CU. IN./REV.  
MHT-70 52.8  
MHT-90 67.9

0 TO 300 RPM  
SPEED RANGE

DWG. NO.  
520230



## MOUNTING AND APPLICATION INFORMATION

### MODEL MHT-70 AND MHT-90-N1-12 - SHAFTLESS

WITH A SHAFTLESS ASSEMBLY, CUSTOMER SHAFT SHALL PROVIDE ITS OWN BEARINGS, AND CENTER THE ROTOR WITHIN .004 T.I.R. CONCENTRICITY TO THE PILOT DIAMETERS. (SHAFTLESS MODELS HAVE NO BEARINGS.)

CUSTOMER'S SHAFT DESIGN MUST PROVIDE FOR SPLINE GREASE RETENTION. SPLINE IS NOT LUBRICATED BY SYSTEM FLUID. CUSTOMER'S SHAFT NEEDS NO SHAFT SEAL SURFACE FOR SYSTEM FLUID RETENTION.

IF CUSTOMER INSTALLATION USES NO BEARINGS IN THE MOTOR, SPLINE GREASE RETENTION MAY BE OBTAINED BY USING A SHAFT SEAL ADAPTER MOUNTED IN THE BEARING BORE WITH "O" RING 154097 AND SNAP RING 351823 OR EQUIVALENT. SEE DESIGN ASSISTANCE SKETCH 23220-K FOR ADAPTER. SUGGESTED SHAFT SEAL SIZE IS 2.75 I.D. (ADAPTER NOT MANUFACTURED BY SPERRY VICKERS - FOR CUSTOMER INFORMATION ONLY.)

A COVER MAY BE MADE TO SEAL OFF SHAFTLESS MODELS AT THIS LOCATION. SEE DESIGN ASSISTANCE SKETCH 23221-K. THE COVER HAS A PROVISION FOR A 1/8 NPT GREASE FITTING. USE WITH "O" RING P/N 154097 AND SNAP RING 351823 OR EQUIVALENT. (COVER 23221-K NOT MANUFACTURED BY SPERRY VICKERS - FOR CUSTOMER INFORMATION ONLY.)

#### SHAFT SPLINE DATA

##### EXTERNAL INVOLUTE SPLINE

##### FILLET ROOT - SIDE FIT

PITCH DIA.	3.2500 REF.
BASE DIA.	2.8146 REF.
NO. OF TEETH	39
DIAMETRAL PITCH	12/24
PRESSURE ANGLE	30°
FORM DIA.	3.1602
MAJOR DIA.	3.3333/3.3283
MINOR DIA.	3.1000/3.0870
FILLET RADII	.034 REF.
CIRCULAR TOOTH THICKNESS	.1262 MAX. ACT. REF. .1247 MIN. ACT.
	.1282 MAX. EFF.
	.1267 MIN. EFF. REF.
	3.4895 MAX. REF.
	3.4870 MIN. REF.

MEASUREMENT OVER .1600 PINS.

WHEN INSTALLING OR DISASSEMBLING A SHAFT, THE SPLINE MUST HAVE A SLIP FIT INTO ROTOR. THERE SHALL BE NO BINDING AND NO AXIAL FORCE APPLIED.

### MODEL MHT-70 AND MHT-90-N1 & R1-12

CUSTOMER MOUNTING SURFACE SHALL BE FLAT WITHIN .001 IN. AND PERPENDICULAR TO AXIS WITHIN .001 TIR.

HOUSING WILL NOT ACCEPT EXTERNAL AXIAL LOADING EXCEPT AT 10.50 BOLT DIAMETER.

ROTOR WILL NOT TAKE SHAFT TRANSLATION (SLIDING AXIALLY THRU SPLINE). SHAFT SPLINE SHOULD BE PACKED WITH FIBROUS WHEEL BEARING GREASE AT SIX MONTH INTERVALS, OR SOONER IF OPERATION IS AT HIGH TEMPERATURE. A STANDARD 1/8 NPT GREASE FITTING MAY BE INSTALLED AT THE END OF THE SHAFT FOR THIS PURPOSE. (NOT SUPPLIED)

SYSTEM CONNECTION PADS ARE FOR USE WITH SAE 4-BOLT FLANGES. REFER TO INSTALLATION DRAWING I-250700 FOR INFORMATION REGARDING VICKERS FL1 SERIES SAE 4-BOLT FLANGES.

IF APPLICATION REQUIRES THAT MOUNTING FACE BE SEALED, A SEALING AREA HAS BEEN PROVIDED FOR 8.50 I.D. "O" RING.

MOTORS MAY BE SUPPLIED WITH THREADS DRILLED OUT OF MOUNTING SURFACE BODY FOR THROUGH MOUNTING WITH STANDARD STUDS OR SCREWS, IF REQUIRED. TORQUE TO 125 ±5 LB. FT. OILED. THRU STUDS NOT INCLUDED. S13 - THREADS DRILLED FROM SHAFT END BODY; S18 - FROM HEAD END BODY.

IF THE SHAFT MUST ABSORB AXIAL FORCES, PRELOADING WILL BE REQUIRED TO PREVENT ANY TRANSLATION. (CONSULT SPERRY VICKERS APPLICATION ENGINEER.) CONVENTIONAL MOUNTING IS WITH SIX SCREWS THRU BACK OF MOUNTING PLATE, 1.75 MAX. INTO MOTOR. TORQUE TO 60-70 LB.-FT. OILED.

PILOT MUST BE A NON-BINDING SLIP FIT, AND SHALL NOT EXCEED .230 MAX. INTO MOTOR.

CASE OUTLET FLOW LINE MUST BE UNRESTRICTED AND SIZED SUCH THAT CASE PRESSURE AT MOTOR NEVER EXCEEDS RATINGS. EITHER CASE OUTLET MAY BE USED, LEAVE OTHER PLUGGED.

#### GENERAL DATA

THE MHT-70 AND MHT-90 ARE HIGH-TORQUE, LOW-SPEED VANE MOTORS. THESE UNITS ARE CAPABLE OF SMOOTH MOTORING SPEEDS THROUGHOUT THEIR ENTIRE PRESSURE AND SPEED RANGE. THEY WILL PERFORM WELL AT MAXIMUM RATED RPM IN EITHER DIRECTION OF ROTATION.

FLUID TO PORT "A" GIVES CW ROTATION VIEWED FROM PORT "A" END AND TO "B" GIVES CCW ROTATION. IN THE EVENT OF HYDRAULIC SURGE PRESSURES APPLIED TO, OR GENERATED BY THE MOTOR, RELIEF PROTECTION MUST BE PROVIDED IN THE CIRCUIT TO PREVENT THESE SURGES FROM EXCEEDING THE MAXIMUM PRES-SURE RATING. THE INLET MUST BE PROVIDED WITH A SUFFICIENT AMOUNT OF OIL TO PREVENT CAVITATION IN OVERRUNNING LOADS. GENERALLY, BRAKING APPLI-CATIONS ARE NOT APPROVED: CONSULT SPERRY VICKERS APPLICATION ENGINEER.

#### INSTALLATION

FILTRATION. . . . . 35 MICRONS ABSOLUTE OR FINER

#### FLUIDS

PETROLEUM OILS - ANTIWEAR TYPE INDUSTRIAL HYDRAULIC OILS OR AUTOMOTIVE CRANKCASE OILS HAVING LETTER DESIGNATIONS SC, SD, OR SE (SEE DATA SHEET I-286-S).

RUNNING VISCOSITY RANGE 70 TO 250 SUS. OPERATING TEMPERATURE 120° F RECOMMENDED, 180° F USUAL MAXIMUM.

FOR DETAILS, SEE HYDRAULIC OIL RECOMMENDATIONS FOR INDUSTRIAL MA-CHINERY, DATA SHEET I-286-S IN SECTION L OF CATALOGUE.

WATER GLYCOLS - SELECT FLUIDS WITH AN OPERATING VISCOSITY OF THE PETRO-LEUM OIL DESCRIBED ABOVE. RECOMMENDED MAXIMUM TEMPERATURE 130° F.

SYNTHETIC FIRE RESISTANT FLUIDS - PHOSPHATE ESTERS AND THEIR BLENDS WITH OPERATING VISCOSITY OF THE PETROLEUM OIL DESCRIBED ABOVE. THESE FLUIDS ARE GENERALLY COMPATIBLE WITH FLUOROCARBON AND SILICONE ELASTOMERS. ADD F3 TO THE MODEL NUMBER.

#### RATINGS

THEORETICAL DISPLACEMENT. . . . .	MHT-70 (REF. .294 GALLONS/REV.)	MHT-90 (REF. .294 GALLONS/REV.)
52.8 CU. IN./REV.	67.9 CU. IN./REV.	67.9 CU. IN./REV.
MAXIMUM ROTATING A PRESSURE. . . . .	3000 PSI	3000 PSI
MAXIMUM PEAK DIFFERENTIAL PRESSURE AT STILL. . . . .	3000 PSI	3000 PSI
MAXIMUM PRESSURE TO INLET OR OUTLET PORT. . . . .	4000 PSI	4000 PSI
MAXIMUM SUM OF PRESSURE AT INLET & OUTLET PORTS. . . . .	4000 PSI	4000 PSI
MAXIMUM OPERATING SPEED		
@ 3000 Δ PSI (CONTINUOUS). . . . .	0 - 150 RPM	0 - 150 RPM
@ 2000 Δ PSI (CONTINUOUS). . . . .	0 - 300 RPM	0 - 300 RPM
THEORETICAL TORQUE / 100 Δ PSI. . . . .	840 IN. LBS.	1080 IN. LBS.
	(REF. 70 FT. LBS.)	(REF. 90 FT. LBS.)

520230-1



TEMPERATURE: (FLUID AT MOTOR INLET)..... 120° F. TYP. TO 180° MAX.  
EXCEPT WATER GLYCOL..... 120° MAX.

CASE DRAIN PRESSURE AT THE MOTOR CASE PORT..... 0 TO 25 PSI MAX.

**BEARING DATA**

BEARING CAPACITY (RADIAL OR AXIAL)..... 6560 LBS. AFBMA @ 33-1/3 RPM  
500 HOURS 8-10 LIFE, 3140 LBS. @ 50 RPM, 15000 HOURS AVERAGE LIFE (UNRELATED  
TO MOTOR LIFE).

PERFORMANCE DATA FOR SPECIFIC APPLICATIONS AVAILABLE ON REQUEST FROM  
YOUR SPERRY VICKERS APPLICATION ENGINEER.

APPROXIMATE INERTIA OF MHT ROTATING GROUPS

WITHOUT SHAFT..... 262 LB.-IN.<sup>2</sup>..... 68 LB.-IN.-SEC.<sup>2</sup>  
WITH SHAFT..... 286 LB.-IN.<sup>2</sup>..... 74 LB.-IN.-SEC.<sup>2</sup>

INTERMITTENT (15 MINUTES OR LESS) UNLOADED RUNNING IS PERMITTED AFTER  
PROPER START AND WARM UP, TO 200 RPM.

THERMAL SHOCKS IN EXCESS OF 50°F. ARE NOT RECOMMENDED. WHEN MOTOR IS  
COLD AND OIL IS HOT, START AND STOP MOTOR UNTIL TEMPERATURES ARE  
EQUALIZED.

**CAUTION**

CASE OUTLET FLOW SHOULD BE UNRESTRICTED AND CHECKED TO ENSURE SOME  
FLOW. THERE SHOULD BE A MINIMUM OF .05 GPM TOTAL. CONTACT SPERRY VICKERS  
REPRESENTATIVE WHEN CASE FLOW IS BELOW MINIMUM. CASE FLOW MAY BE IN-  
CREASED BY APPLYING BACK PRESSURE TO MOTOR RETURN PORT.

MOTOR MOUNTING ORIENTATION IS UNRESTRICTED AS TO PORT LOCATION AND  
MOUNTING FACE. THE SHAFT MAY PROTRUDE FROM EITHER BODY.

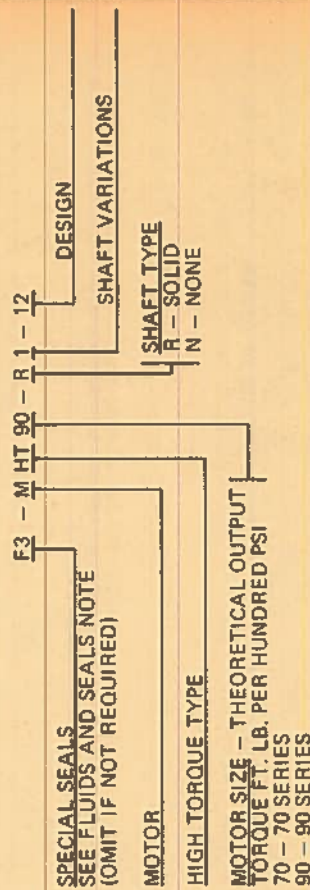
**STARTING**

IT IS GOOD PRACTICE TO LUBRICATE THE INTERNAL PARTS OF THESE NEW UNITS  
WITH HYDRAULIC FLUID BEFORE START-UP. ADD THE HYDRAULIC FLUID USED, TO  
THE INLET, OUTLET OR CASE OF THE MHT MOTORS PRIOR TO STARTING. FOR MORE  
COMPLETE INFORMATION ON START-UP, PLEASE CONTACT YOUR LOCAL SPERRY  
VICKERS REPRESENTATIVE.

**WEIGHT LBS. (APPROX.)**

WITH SHAFT..... 240  
WITHOUT SHAFT..... 210

**MODEL CODE**









## GENERAL DATA

THE MHT-70/35/35 & MHT-90/45/45 ARE MULTI-DISPLACEMENT, BI-DIRECTIONAL HIGH-TORQUE LOW-SPEED VANE MOTORS. THESE UNITS ARE CAPABLE OF SMOOTH SPEEDS THROUGHOUT THEIR ENTIRE PRESSURE AND SPEED RANGE. THE MULTI-DISPLACEMENT FEATURE PROVIDES FOR SELECTION OF TWO SPEED OPERATIONS FOR A GIVEN FLOW AND TWO TORQUE CAPACITIES CORRESPONDING TO THE SPEEDS. SEE RATINGS BELOW AND ITEM 49.

## ROTATION

FLUID TO PORTS "A" GIVES CW ROTATION.  
FLUID TO PORT "B" GIVES CCW ROTATION.

## RATINGS

### THEORETICAL DISPLACEMENT

MHT90/45/45..... 67.9 & 33.9 IN.<sup>3</sup>/REV.  
MHT70/35/35..... 52.8 & 26.4 IN.<sup>3</sup>/REV.

### THEORETICAL OUTPUT TORQUE PER 100 PSI DIFFERENTIAL

MHT90/45/45..... 90 & 45 lbf · ft  
MHT70/35/35..... 70 & 35 lbf · ft

### CASE PRESSURE

MHT90/45/45..... 0 TO 25 PSI MAX.  
MHT70/35/35..... 0 TO 25 PSI MAX.

### MAXIMUM ROTATING PRESSURE

MHT90/45/45..... 3000 PSI  
MHT70/35/35..... 3000 PSI

### MAXIMUM SPEED UP TO 3000 PSI DIFFERENTIAL

MHT90/45/45..... 150 RPM  
MHT70/35/35..... 150 RPM

### MAXIMUM BREAKAWAY PRESSURE (STALL - NO ROTATION)

MHT90/45/45..... 4000 PSI  
MHT70/35/35..... 4000 PSI

### MAXIMUM PRESSURE TO INLET OR OUTLET PORT

MHT90/45/45..... 4000 PSI  
MHT70/35/35..... 4000 PSI

### MAXIMUM SUM OF PRESSURE AT INLET & OUTLET PORTS

MHT90/45/45..... 4000 PSI  
MHT70/35/35..... 4000 PSI

PERFORMANCE DATA FOR SPECIFIC APPLICATIONS AVAILABLE ON REQUEST FROM YOUR SPERRY VICKERS APPLICATION ENGINEER.

### APPROXIMATE INERTIA OF MHT ROTATING GROUPS

WITHOUT SHAFT..... 262 lbf · in.<sup>2</sup>  
WITH SHAFT..... 286 lbf · in.<sup>2</sup>

### BEARING DATA

BEARING CAPACITY (RADIAL OR AXIAL)..... 6660 LBS. AFBMA @ 33-1/3 RPM  
500 HOURS B-10 LIFE, 3140 LBS. @ 50 RPM, 15000 HOURS AVERAGE LIFE  
(UNRELATED TO MOTOR LIFE).

### BRAKING

CONSULT WITH SPERRY VICKERS APPLICATION ENGINEER FOR MODEL SERIES.

### WEIGHT LBS. (APPROX.)

WITH SHAFT..... 210  
WITHOUT SHAFT..... 240

### MOUNTING

1 MOTOR HOUSING WILL ACCEPT NO AXIAL LOADING EXCEPT AT 10.50 DIA. BOLT CIRCLE.

2 CUSTOMER MOUNTING SURFACE SHALL BE FLAT WITHIN .001 IN. AND PERPENDICULAR TO AXIS WITHIN .001.

3 THE SPLINED ROTOR WILL NOT ACCEPT ANY SHAFT-TRANSLATION, (SLIDING AXIALLY THRU SPLINE).

4 IF THE SHAFT MUST ABSORB AXIAL FORCES, PRELOADING WILL BE REQUIRED TO PREVENT ANY TRANSLATION. (CONSULT SPERRY VICKERS APPLICATION ENGINEER.)

5 IF THE APPLICATION REQUIRES THE MOUNTING FACE TO BE SEALED, AN AREA HAS BEEN PROVIDED FOR USE WITH AN 8.50 ID "O" RING SUCH AS SPERRY VICKERS P/N 154120.

6

MOTORS MAY BE SUPPLIED WITH THREADS DRILLED OUT OF MOUNTING SURFACE BODY FOR THROUGH MOUNTING WITH STANDARD STUDS OR SCREWS, IF REQUIRED. BOLT TORQUE MUST BE 125 ± 5 LBS. FT. OILED. S13 - THREADS DRILLED FROM SHAFT END BODY; S18 - FROM HEAD END BODY.

7

CONVENTIONAL MOUNTING IS WITH SIX .6250-11 - UNC-2A SCREWS THRU BACK OF MOUNTING PLATE, 1.25 MAX. INTO MOTOR. TORQUE TO 60-70 LB.-FT. OILED.

8

MOTOR MOUNTING ORIENTATION IS UNRESTRICTED AS TO PORT LOCATION AND MOUNTING FACE. THE SHAFT MAY PROTRUDE FROM EITHER BODY.

9

MAXIMUM PILOT LENGTH .250 (MUST BE NON-BINDING SLIP FIT).

## SHAFT DATA

### EXTERNAL INVOLUTE SPLINE DATA

FILLET RADIUS - .034 REF.

TOOTH THICKNESS -

MIN. ACT. - .1247

MAX. ACT. - .1262 (REF.)

MIN. EFF. - .1262

MAX. EFF. - .1267 (REF.)

DIMENSION OVER PINS -

3.4895/3.4870 REF.

PIN DIA. - .1600 BASIC

FILLET ROOT - SIDE FIT

MAJOR DIA. - 3.3333/3.3283

MINOR DIA. - 3.1000/3.0870

DIAMETRAL PITCH - 12/24

PITCH DIA. - 3.2500 REF.

NO. OF TEETH - 39

PRESSURE-ANGLE - 30°

BASE DIA. - 2.8146 REF.

FORM DIA. - 3.1602

22

SHAFT DESIGN MUST PROVIDE SPLINE GREASE RETENTION. SPLINE IS NOT LUBRICATED BY SYSTEM FLUID. CUSTOMER SHAFT NEEDS NO SHAFT SEAL SURFACE FOR SYSTEM FLUID RETENTION.

23

WHEN DISASSEMBLING OR INSTALLING A SHAFT, THERE SHALL BE NO BINDING AND NO AXIAL FORCE APPLIED TO THE ROTOR.

24

WITH A SHAFTLESS ASSEMBLY, THE CUSTOMER SHAFT SHALL PROVIDE ITS OWN BEARINGS, AND CENTER THE ROTOR WITH .004 TIR CONCENTRICITY TO THE PILOT DIAMETERS.

25

THE SHAFT SPLINE SHOULD BE PACKED WITH FIBROUS WHEEL-BEARING GREASE AT SIX MONTH INTERVALS, OR SOONER IF APPLICATION REQUIRES. A STANDARD 1/8 NPTF GREASE FITTING MAY BE INSTALLED AT THE END OF THE SHAFT FOR THIS PURPOSE. (NOT SUPPLIED WITH STANDARD ASSEMBLY.)

26

A COVER MAY BE MADE TO SEAL OFF SHAFTLESS MODELS AT THIS LOCATION. SEE DESIGN ASSISTANCE SKETCH NO. 23221-K. THE COVER HAS PROVISION FOR A 1/8 NPTF GREASE FITTING. USE WITH "O" RING P/N 154097 SNAP RING 351823 OR EQUIVALENT (COVER 23221-K NOT MANUFACTURED BY SPERRY VICKERS - FOR CUSTOMER INFORMATION ONLY.)

27

IF CUSTOMER INSTALLATION USES NO BEARINGS IN THE MOTOR, SPLINE GREASE RETENTION MAY BE OBTAINED BY USING A SHAFT SEAL ADAPTED TO THE BEARING BORE. SEE DESIGN ASSISTANCE SKETCH NO. 23220-K. USE WITH "O" RING 154097 AND SNAP RING 351823 OR EQUIVALENT. SUGGESTED SHAFT SEAL SIZE IS 2.75 ID. (ADAPTER NOT MANUFACTURED BY SPERRY VICKERS - FOR CUSTOMER INFORMATION ONLY.)



# SPERRY VICKERS<sup>TM</sup> HYDRAULIC VANE MOTORS MULTI-TORQUE

MODEL SERIES MHT-70/35/35 AND MHT-90/45/45  
HIGH TORQUE - LOW SPEED  
DUAL FIXED DISPLACEMENT

## CIRCUIT

**FLUIDS**  
PETROLEUM OILS - ANTIWEAR TYPE INDUSTRIAL HYDRAULIC OILS OR AUTOMOTIVE CRANKCASE OILS HAVING LETTER DESIGNATIONS SC, SD, OR SE.

RUNNING VISCOSITY RANGE 70 TO 250 SUS. OPERATING TEMPERATURE 120° F RECOMMENDED, 180° F USUAL MAXIMUM.

FOR DETAILS, SEE HYDRAULIC OIL RECOMMENDATIONS FOR INDUSTRIAL MACHINERY, DATA SHEET I-286-S IN SECTION L OF CATALOGUE.

**WATER GLYCOLS** - SELECT FLUIDS WITH AN OPERATING VISCOSITY OF THE PETROLEUM OIL DESCRIBED ABOVE. RECOMMENDED MAXIMUM TEMPERATURE 130° F.

**SYNTHETIC FIRE RESISTANT FLUIDS** - PHOSPHATE ESTERS AND THEIR BLENDS WITH OPERATING VISCOSITY OF THE PETROLEUM OIL DESCRIBED ABOVE. THESE FLUIDS ARE GENERALLY COMPATIBLE WITH FLUOROCARBON AND SILICONE ELASTOMERS. ADD F3 TO THE MODEL NUMBER.

43. FLUID FILTRATION. .... 35 MICRONS ABSOLUTE OR FINER

44. CIRCUIT DESIGN SHOULD PROTECT MOTOR FROM PRESSURE SURGES AND/OR CAVITATION.

45. CASE OUTLET FLOW LINE MUST BE UNRESTRICTED AND SIZED SUCH THAT CASE PRESSURE AT MOTOR NEVER EXCEEDS RATINGS. EITHER CASE OUTLET MAY BE USED, LEAVE OTHER PLUGGED.

46. INTERMITTENT (15 MINUTES OR LESS) UNLOADED RUNNING IS PERMITTED AFTER PROPER START AND WARM UP, TO 200 RPM.

47. CASE OUTLET FLOW MUST BE CHECKED FOR MINIMUM OF .05 GPM. IF NECESSARY, CASE FLOW MAY BE INCREASED BY BACK-PRESSURE AT THE MOTOR OUTLET PORT.

48. THERMAL SHOCKS IN EXCESS OF 50 FAHRENHEIT DEGREES ARE NOT RECOMMENDED. WHEN MOTOR IS COLD AND OIL IS HOT, START AND STOP MOTOR UNTIL TEMPERATURES ARE EQUALIZED.

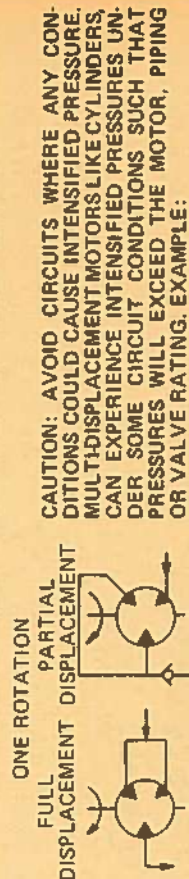
49. FOR MULTI-TORQUE AND MULTI-SPEED OPERATION IT IS PREFERRED THAT THE "B" SINGLE PORT BODY BE USED AS INLET. IF BI-DIRECTIONAL ROTATION IS REQUIRED, USE THE "B" PORT FOR PRIMARY DIRECTION OF ROTATION. WHEN "B" PORT IS INLET THE IDLING "A" PORT MUST BE CONNECTED TO THE "B" PORT. SEE DIAGRAMS BELOW. A1 AND A2 PORT DISPLACEMENT IS 33.9 C.I.R. ON THE MHT-90/45/45 AND 26.4 C.I.R. ON THE MHT-70/35/35. USE OF BOTH "A" PORTS GIVES MAXIMUM DISPLACEMENT OF EACH MODEL.

AT START UP: MAXIMUM START UP VISCOSITY 500 SSU. MOTORS SHOULD BE STARTED UNDER LOAD TO INDUCE CASE ROTOR LUBRICATION FLOW. MINIMUM CASE FLOW UNDER ANY CONDITION SHOULD BE .05 GPM. FOR MORE COMPLETE INFORMATION ON START-UP, PLEASE CONTACT YOUR LOCAL SPERRY VICKERS REPRESENTATIVE.

**NOTE:**  
IT IS GOOD PRACTICE TO LUBRICATE THE INTERNAL PARTS OF THESE NEW UNITS WITH HYDRAULIC FLUID BEFORE START-UP. ADD THE HYDRAULIC FLUID USED, TO THE INLET, OUTLET, OF THE MHT MOTORS PRIOR TO STARTING.

MODEL CODE	F3 - MHT 90/45/45 - ** - 12	DESIGN NUMBER
SPECIAL SEALS SEE FLUIDS AND SEALS NOTE		SUBJECT TO CHANGE. INSTALLATION DIMENSIONS REMAIN AS SHOWN FOR DESIGN NUMBERS 10 THRU 19.
VANE MOTOR HIGH TORQUE - LOW SPEED		SHAFT TYPE R1 = STANDARD SOLID SHAFT N1 = NO SHAFT
COMBINATIONS OF THEORETICAL OUTPUT TORQUE lbf-ft/100 Δ PSI		
70/35/35 SERIES 90/45/45 SERIES		

## MOTOR INSTALLATION POSSIBILITIES FOR FULL AND PARTIAL DISPLACEMENT AND BOTH DIRECTIONS OF ROTATION



**NOTE:** USE OF CHECK VALVE DEPENDS ON CIRCUIT NEEDS.

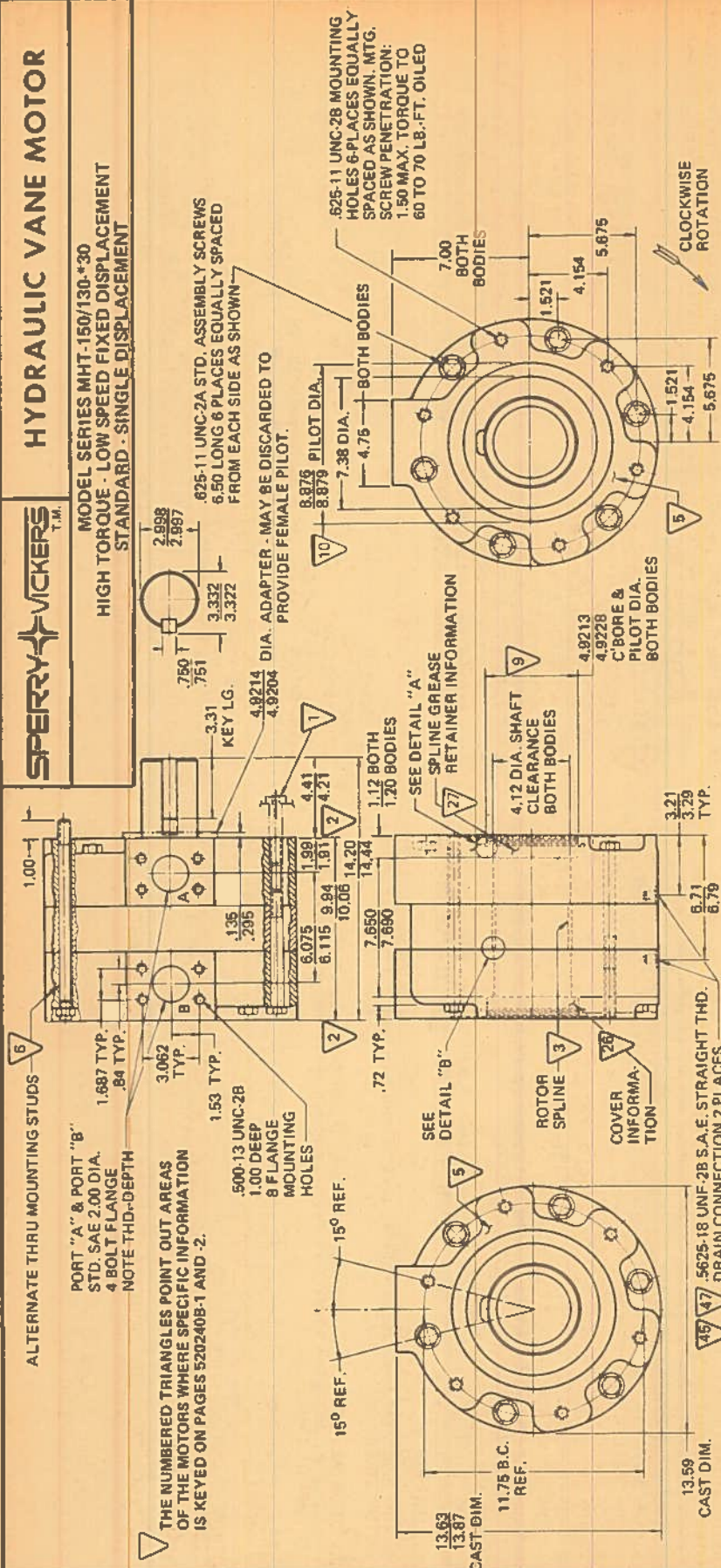


## HYDRAULIC VANE MOTOR



**MODEL SERIES MHT-150/130\*30**

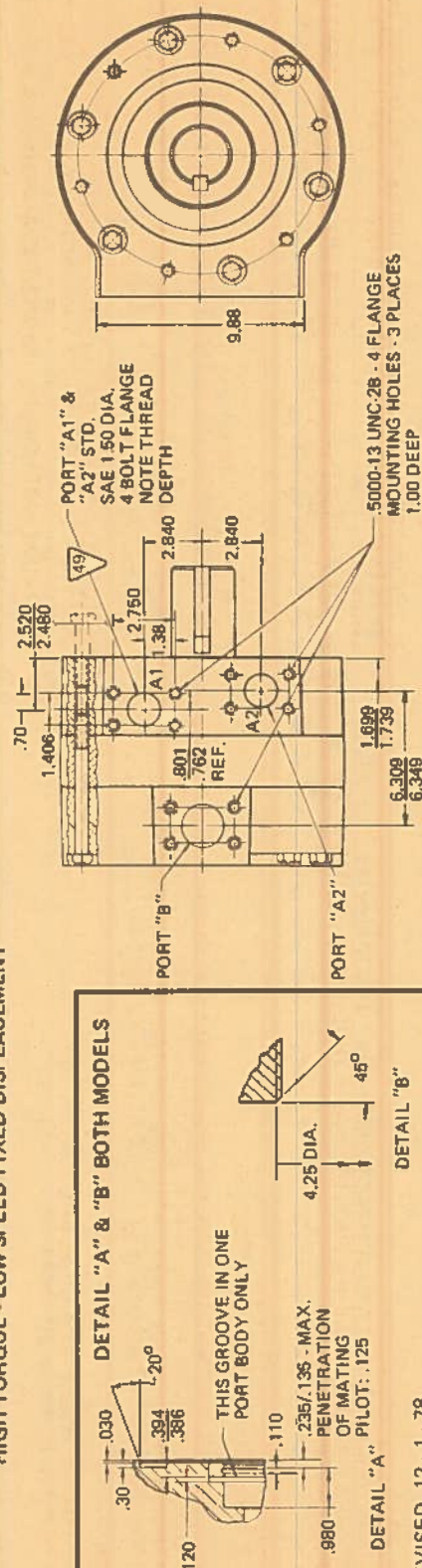
**MODEL SERIES RNT-150/130/100  
HIGH TORQUE · LOW SPEED FIXED DISPLACEMENT  
STANDARD · SINGLE DISPLACEMENT**



## HYDRAULIC VANE MOTORS MULTI-TORQUE

**MODEL SERIES MHT-130/75/55 AND MHT-150/75/55-30 DESIGN  
HIGH TORQUE LOW SPEED FIXED DISPLACEMENT**

NOTE: ALL OTHER DIMENSIONS AND VIEWS SAME AS ABOVE.



REVISÉ 12.1.78

5202408

**S**PERRY  **VICKERS**  
T.M.  
TROY, MICHIGAN 48064

**VANE MOTORS  
HIGH TORQUE  
LOW SPEED**

**THEORETICAL TORQUE**  
STD. 130 & 150 LB. FT.  
MULTI 55, 75, 130 & 150 LB. FT.

**THEORETICAL DISPLACEMENT**  
STD. 98 & 113 CU. IN./REV.  
MULTI 41.5, 56.5, 97 & 113 CU. IN./REV.

**SPEED  
RANGE  
0-250**

DWG. NO.  
5202408



## GENERAL DATA

THE MHT 150 SERIES MOTORS ARE BI-DIRECTIONAL HIGH-TORQUE LOW-SPEED VANE MOTORS. THEY ARE CAPABLE OF SMOOTH SPEEDS THROUGHOUT THEIR ENTIRE PRESSURE AND SPEED RANGES.

THE MHT 130 & 150-30 PROVIDES A SINGLE DISPLACEMENT, ONE SPEED AND ONE TORQUE FOR A GIVEN FLOW AND PRESSURE.

THE MHT-150/75/75 AND MHT-130/75/55 ARE MULTI-TORQUE MOTORS. THE MULTI-DISPLACEMENT FEATURE PROVIDES FOR SELECTION OF TWO OR THREE SPEED OPERATIONS FOR A GIVEN FLOW, AND TWO OR THREE TORQUE CAPACITIES CORRESPONDING TO THE SPEEDS. SEE RATINGS BELOW AND ITEM 49.

## ROTATION

FLUID TO PORTS "A" GIVES CW ROTATION.  
FLUID TO PORT "B" GIVES CCW ROTATION.

## RATINGS

NOMINAL SIZE	150	130	75	55
THEORETICAL DISPLACEMENT (IN. <sup>3</sup> /REV.)	113	98	56.5	41.5
THEORETICAL OUTPUT TORQUE PER 100 PSI DIFFERENTIAL (LB. FT.)	150	130	75	55

DRAIN PRESSURE (PSI) MAX. .... 0-25  
 MAXIMUM ROTATING PRESSURE ..... 3000 PSI  
 MAXIMUM SPEED AT 3000 PSI DIFFERENTIAL ..... 150 RPM  
 MAXIMUM SPEED AT 2000 PSI DIFFERENTIAL ..... 250 RPM  
 MAXIMUM BREAKAWAY PRESSURE (STALL - NO ROTATION) ..... 4000 PSI  
 MAXIMUM PRESSURE TO INLET OR OUTLET PORT ..... 4000 PSI  
 MAXIMUM SUM OF PRESSURE AT INLET & OUTLET PORTS ..... 4000 PSI  
 PERFORMANCE DATA FOR SPECIFIC APPLICATIONS AVAILABLE ON REQUEST FROM YOUR SPERRY VICKERS APPLICATION ENGINEER.

APPROXIMATE INERTIA OF MHT ROTATING GROUPS  
 WITHOUT SHAFT ..... 477 LB.-IN.<sup>2</sup>  
 WITH SHAFT ..... 548 LB.-IN.<sup>2</sup>  
 1.24 LB.-IN.-SEC.<sup>2</sup>  
 1.42 LB.-IN.-SEC.<sup>2</sup>

## BEARING DATA

BEARING CAPACITY (RADIAL OR AXIAL) ..... 8235 LBS. AFBMA @ 33-1/3 RPM,  
 500 HOURS B-10 LIFE, 3940 LBS. @ 50 RPM, 15000 HOURS AVERAGE LIFE (UNRELATED TO MOTOR LIFE).

**BRAKING**  
 THIS MOTOR MAY BE USED AS A BRAKE AT ANY SPEED AND PRESSURE COMBINATION PERMISSIBLE BY MOTOR RATINGS AT FULL DISPLACEMENT ONLY ON SINGLE OR MULTI-TORQUE TYPE.

WEIGHT LBS. (APPROX.) ..... 312  
 WITH SHAFT ..... 358

## MOUNTING

1 MOTOR HOUSING WILL ACCEPT NO AXIAL LOADING EXCEPT AT 11.75 DIA. BOLT CIRCLE.

2 CUSTOMER MOUNTING SURFACE SHALL BE FLAT WITHIN .001 IN. AND PERPENDICULAR TO AXIS WITHIN .001 TIR.

3 THE SPLINED ROTOR WILL NOT ACCEPT ANY SHAFT-TRANSLATION, (SLIDING AXIALLY THRU SPLINE).

4 IF THE SHAFT MUST ABSORB AXIAL FORCES, PRELOADING WILL BE REQUIRED TO PREVENT ANY TRANSLATION. (CONSULT SPERRY VICKERS APPLICATION ENGINEER.)

5 IF THE APPLICATION REQUIRES THE MOUNTING FACE TO BE SEALED, AN AREA HAS BEEN PROVIDED FOR USE WITH A 9.25 ID "O" RING SUCH AS SPERRY VICKERS P/N 199829 OR EQUIVALENT.

6 MOTORS MAY BE SUPPLIED WITH THREADS DRILLED OUT OF MOUNTING SURFACE BODY FOR THROUGH MOUNTING WITH STANDARD STUDS OR SCREWS, IF REQUIRED. TORQUE TO 125 ± 5 LB. FT. OILED THRU STUDS NOT INCLUDED. S13 - THREADS DRILLED FROM SHAFT END BODY: S18 - FROM HEAD END BODY.

7 CONVENTIONAL MOUNTING IS WITH .6250-11 UNC-2A SCREWS THRU BACK OF MOUNTING PLATE, 1.50 MAX. INTO MOTOR. (6 PLACES EQUALLY SPACED ON 11.750 DIAMETER B.C. REF.). TORQUE TO 60-70 LB.-FT. OILED.

8 MOTOR MOUNTING ORIENTATION IS UNRESTRICTED AS TO PORT LOCATION AND MOUNTING FACE. THE SHAFT MAY PROTRUDE FROM EITHER BODY.

9 MAXIMUM PILOT LENGTH .130 (MUST BE NON-BINDING SLIP FIT).

10 MAXIMUM PILOT LENGTH .250 (MUST BE NON-BINDING SLIP FIT).

11 DOWEL HOLES .6254/6264 DIA. - 1.00 DEEP MAY BE ADDED BY CUSTOMER AT ANY TWO (180° APART) OF THESE SIX MOUNTING HOLES IF REQUIRED.

## SHAFT DATA

21 CUSTOMER SHAFT DESIGN MUST PROVIDE SPLINE GREASE RETENTION. SPLINE IS NOT LUBRICATED BY SYSTEM FLUID. CUSTOMER SHAFT NEEDS NO SHAFT SEAL SURFACE FOR SYSTEM FLUID RETENTION.

22

SHAFT SPLINE DATA -

EXTERNAL INVOLUTE SPLINE

FILLET ROOT - SIDE FIT  
 PITCH DIA. - 4.0000 REF.  
 BASE DIA. - 3.4641 REF.

NO. OF TEETH - 40

DIAMETRAL PITCH - 10/20

PRESSURE ANGLE - 30°

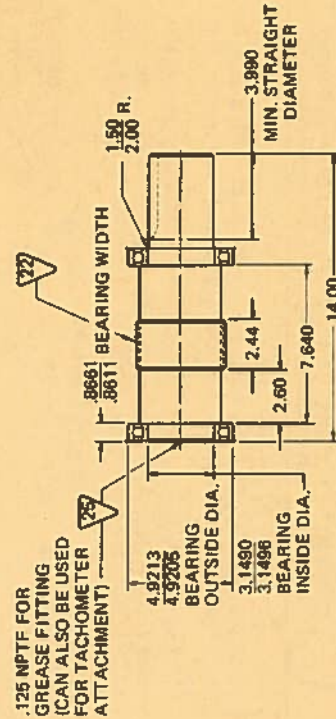
FORM DIA. - 3.8920

MAJOR DIA. - 4.1000/4.0950

MINOR DIA. - 3.8200/3.8050

FILLET RADIUS - .040 REF.  
 CIRCULAR TOOTH THICKNESS -  
 .1523 MAX. ACT. REF.  
 .1508 MIN. ACT.  
 .1544 MAX. EFF.

MEASUREMENT OVER .1920 PINS:  
 4.2921 MIN. EFF. REF.  
 4.2921 MAX. REF.  
 4.2896 MIN. REF.





- 23 WHEN DISASSEMBLING OR INSTALLING A SHAFT, THERE SHALL BE NO BINDING AND NO AXIAL FORCE APPLIED TO THE ROTOR.
- 24 WITH A SHAFTLESS ASSEMBLY, THE CUSTOMER SHAFT SHALL PROVIDE ITS OWN BEARINGS, AND CENTER THE ROTOR WITH .004 TIR CONCENTRICITY TO THE PILOT DIAMETERS.

25 THE SHAFT SPLINE SHOULD BE PACKED WITH FIBROUS WHEEL-BEARING GREASE AT SIX MONTH INTERVALS, OR SOONER IF APPLICATION REQUIRES. A STANDARD 1/8 NPTF GREASE FITTING MAY BE INSTALLED AT THE END OF THE SHAFT FOR THIS PURPOSE. (NOT SUPPLIED WITH STANDARD ASSEMBLY.)

26 A COVER MAY BE MADE TO SEAL OFF SHAFTLESS MODELS AT THIS LOCATION. SEE DESIGN ASSISTANCE SKETCH NO. 23127-K. THIS COVER HAS PROVISION FOR A 1/8 NPTF GREASE FITTING. USE WITH "O" RING P/N 275965 AND SNAP RING 373434 OR EQUIVALENT. (COVER 23127-K NOT MANUFACTURED BY SPERRY VICKERS - FOR CUSTOMER INFORMATION ONLY.)

27 IF CUSTOMER INSTALLATION USES NO BEARINGS IN THE MOTOR, SPLINE GREASE RETENTION MAY BE OBTAINED BY USING A SHAFT SEAL ADAPTER MOUNTED IN THE BEARING BORE WITH "O" RING 275965 AND SNAP RING 373434 OR EQUIVALENT. SEE DESIGN ASSISTANCE SKETCH 23126-K FOR ADAPTER. SUGGESTED SHAFT SEAL SIZE 3.13 ID (ADAPTER 23126-K NOT MANUFACTURED BY SPERRY VICKERS - FOR CUSTOMER INFORMATION ONLY.)

#### CIRCUIT

##### 41 FLUIDS

PETROLEUM OILS - SELECT ANTIWEAR TYPE INDUSTRIAL HYDRAULIC OILS OR AUTOMOTIVE CRANKCASE OILS WITH A NOMINAL VISCOSITY OF 150 TO 315 SUS AT 100° F. AND HAVING LETTER DESIGNATION "SC, SD, OR SE" PER SAE TECHNICAL REPORT J183a. OPERATING VISCOSITY RANGE IS 70 TO 250 SUS. OPERATING TEMPERATURE OF 120° F. TYPICAL TO 180° F. MAXIMUM IS RECOMMENDED. REFER TO DATA SHEET I-286-S (SECTION L) FOR HYDRAULIC OIL RECOMMENDATIONS.

WATER CONTAINING FLUIDS - WATER GLYCOLS (NOT WATER-IN-OIL EMULSIONS) AS PRODUCED BY RESPONSIBLE SOURCES FOR RATINGS GIVEN HEREIN, ARE RECOMMENDED. SELECT FLUIDS WITH A VISCOSITY AS CLOSE AS POSSIBLE TO THAT OF PETROLEUM OIL DESCRIBED ABOVE. IT IS RECOMMENDED THAT TEMPERATURES FOR WATER BASE FLUIDS BE LIMITED TO A MAXIMUM OF 130° F.

SYNTHETIC FIRE RESISTANT FLUIDS - PHOSPHATE ESTERS AND ITS BLENDS AS PRODUCED BY RESPONSIBLE SOURCES FOR RATINGS GIVEN HEREIN AS RECOMMENDED. SELECT FLUIDS WITH VISCOSITY AS CLOSE AS POSSIBLE TO THAT OF PETROLEUM OIL DESCRIBED ABOVE. THE FLUID MUST BE COMPATIBLE WITH SEALS OF FLUOROCARBON ELASTOMERS (I.E. VITON, ETC.). TO OBTAIN MOTORS EQUIPPED FOR OPERATION WITH SYNTHETIC FIRE RESISTANT FLUIDS, ADD THE PREFIX "F3" TO THE MODEL NUMBER.

- 42 FLUID TEMPERATURE..... 120° F. TYP. TO 180° F. MAX.
- 43 FLUID FILTRATION..... 35 MICRONS ABSOLUTE OR FINER
- 44 CIRCUIT DESIGN SHOULD PROTECT MOTOR FROM PRESSURE SURGES AND/OR CAVITATION.

45 CASE OUTLET FLOW LINE MUST BE UNRESTRICTED AND SIZED SUCH THAT CASE PRESSURE AT MOTOR NEVER EXCEEDS RATINGS. EITHER CASE OUTLET MAY BE USED. LEAVE OTHER PLUGGED.

46 INTERMITTENT (15 MINUTES OR LESS) UNLOADED RUNNING IS PERMITTED AFTER PROPER START AND WARM UP, TO 200 RPM.

47 CASE OUTLET FLOW MUST BE UNRESTRICTED AND MUST BE CHECKED FOR MINIMUM OF .05 GPM.

48 THERMAL SHOCKS IN EXCESS OF 50° F. ARE NOT RECOMMENDED. WHEN MOTOR IS COLD AND OIL IS HOT, START AND STOP MOTOR UNTIL TEMPERATURES ARE EQUALIZED. FOR MORE COMPLETE INFORMATION ON START-UP, PLEASE CON-

TACT YOUR LOCAL SPERRY VICKERS REPRESENTATIVE.

FOR MULTI-TORQUE AND MULTI-SPEED OPERATION IT IS PREFERRED THAT THE "B" SINGLE PORT BODY BE USED AS INLET. IF BI-DIRECTIONAL ROTATION IS REQUIRED, USE THE "B" PORT FOR PRIMARY DIRECTION OF ROTATION. WHEN "B" PORT IS INLET THE IDLING "A" PORT MUST BE CONNECTED TO THE "B" PORT. SEE DIAGRAMS BELOW "A1" AND "A2" PORT DISPLACEMENTS 56.5 C.I.R. ON THE MHT-150/75/75. ON THE MHT-130/75/55 MOTOR THE A1 PORT DISPLACEMENT IS 56.5 C.I.R. AND THE A2 PORT IS 41.5 C.I.R. USE OF BOTH "A" PORTS GIVES MAXIMUM DISPLACEMENT OF EACH MODEL.

#### NOTE:

IT IS GOOD PRACTICE TO LUBRICATE THE INTERNAL PARTS OF THESE NEW UNITS WITH HYDRAULIC FLUID BEFORE START-UP. ADD THE HYDRAULIC FLUID USED, TO THE INLET, OUTLET, OF THE MHT MOTORS PRIOR TO STARTING.

MODEL CODE	F3 - MHT - 130/75/55 . . . . 30	DESIGN NUMBER
SPECIAL SEALS		SUBJECT TO CHANGE. INSTALLATION DIMENSIONS REMAIN AS SHOWN FOR DESIGN NUMBERS 30 THRU 39.
SEE FLUIDS AND SEALS NOTE.		
HIGH TORQUE		
LOW SPEED VANE MOTOR		
THEORETICAL OUTPUT		SHAFT TYPE
TORQUE LB.-FT./1000 PSI		R1 = STANDARD SOLID SHAFT
130 - 130 STD. SERIES		
150 - 150 STD. SERIES		
130 - 130/75/55 MULTI-TORQUE SERIES		
150 - 150/75/75 MULTI-TORQUE SERIES		

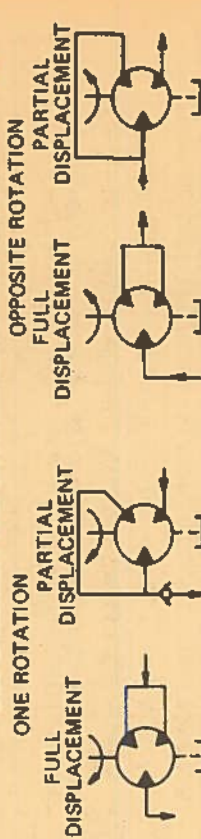
#### STANDARD GRAPHICAL SYMBOLS FOR FLUID POWER DIAGRAMS



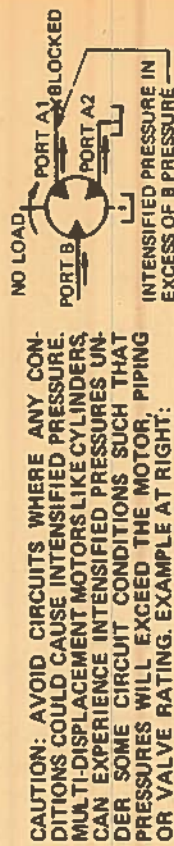
#### STANDARD MOTOR

##### MULTI-TORQUE MOTORS

MOTOR INSTALLATION POSSIBILITIES FOR FULL AND PARTIAL DISPLACEMENT AND BOTH DIRECTIONS OF ROTATION.



NOTE: USE OF CHECK VALVE DEPENDS ON CIRCUIT NEEDS.



CAUTION: AVOID CIRCUITS WHERE ANY CONDITIONS COULD CAUSE INTENSIFIED PRESSURE. MULTI-DISPLACEMENT MOTORS LIKE CYLINDERS, CAN EXPERIENCE INTENSIFIED PRESSURES UNDER SOME CIRCUIT CONDITIONS SUCH THAT PRESSURES WILL EXCEED THE MOTOR, PIPING OR VALVE RATING. EXAMPLE AT RIGHT:











**24** WHEN DISASSEMBLING OR INSTALLING A SHAFT, THERE SHALL BE NO BINDING AND NO AXIAL FORCE APPLIED.

**25** WITH A SHAFTLESS ASSEMBLY, THE CUSTOMER SHAFT SHALL PROVIDE ITS OWN BEARINGS, AND CENTER THE ROTOR WITH .004 TIR CONCENTRICITY TO THE PILOT DIAMETERS.

**26** THE SHAFT SPLINE SHOULD BE PACKED WITH FIBROUS WHEEL-BEARING GREASE AT SIX MONTH INTERVALS, OR SOONER IF OPERATION IS AT HIGH TEMPERATURE. A STANDARD 1/8 NPT GREASE FITTING MAY BE INSTALLED AT THE END OF THE SHAFT FOR THIS PURPOSE.

**27** A COVER MAY BE MADE TO SEAL OFF SHAFTLESS MODELS AT THIS LOCATION. SEE DESIGN ASSISTANCE SKETCH 23263-K. THE COVER HAS PROVISION FOR A 1/8 NPT GREASE FITTING. USE WITH "O" RING P/N 154057 AND SNAP RING 354386 OR EQUIVALENT. (COVER 23263-K NOT MANUFACTURED BY SPERRY VICKERS - FOR CUSTOMER INFORMATION ONLY.)

**28** IF CUSTOMER INSTALLATION USES NO BEARINGS IN THE MOTOR, SPLINE GREASE RETENTION MAY BE OBTAINED BY USING A SHAFT SEAL ADAPTER MOUNTED IN THE BEARING BORE WITH "O" RING 154057 AND SNAP RING 354386 OR EQUIVALENT. SEE DESIGN ASSISTANCE SKETCH 23262-K FOR ADAPTER. SUGGESTED SHAFT SEAL SIZE IS 4.125 ID. (ADAPTER NOT MANUFACTURED BY SPERRY VICKERS - FOR CUSTOMER INFORMATION ONLY.)

#### CIRCUIT

**41** **FLUIDS**  
PETROLEUM OILS AND FLUID TEMPERATURE - USE ANTIWEAR TYPE HYDRAULIC OILS OR SAE 10W OR 20-20W OILS HAVING LETTER DESIGNATIONS "SC, SD, OR SE" PER SAE TECHNICAL REPORT J183a. (SEE "OIL RECOMMENDATION SHEET 286-S" FOR DETAILS.) MOTOR OPERATING FLUID VISCOSITY IS 70 TO 250 SUS. OIL TEMPERATURE OF 120°F. TO 180°F. MAXIMUM IS TYPICAL. LOWER VISCOSITIES (100 SSU) TEND TO REDUCE SOUND.

WATER CONTAINING FLUIDS - WATER GLYCOLS (NOT WATER-IN-OIL EMULSIONS) AS PRODUCED BY RESPONSIBLE SOURCES FOR RATINGS GIVEN HEREIN, ARE RECOMMENDED. SELECT FLUIDS WITH A VISCOSITY AS CLOSE AS POSSIBLE TO THAT OF PETROLEUM OIL DESCRIBED ABOVE. IT IS RECOMMENDED THAT TEMPERATURES FOR WATER BASE FLUIDS BE LIMITED TO A MAXIMUM OF 130°F.

SYNTHETIC FIRE RESISTANT FLUIDS - PHOSPHATE ESTERS AND ITS BLENDS AS PRODUCED BY RESPONSIBLE SOURCES FOR RATINGS GIVEN HEREIN ARE RECOMMENDED. SELECT FLUIDS WITH VISCOSITY AS CLOSE AS POSSIBLE TO THAT FOR PETROLEUM OIL DESCRIBED ABOVE. THE FLUID MUST BE COMPATIBLE WITH SEALS OF FLUOROCARBON ELASTOMERS. (i.e., VITON, ETC.). TO OBTAIN MOTORS EQUIPPED FOR OPERATION WITH SYNTHETIC FIRE RESISTANT FLUIDS, ADD THE PREFIX "F3" TO THE MODEL NUMBER.

**42** FLUID FILTRATION. . . . . 35 MICRONS ABSOLUTE OR FINER

**43** CIRCUIT DESIGN SHOULD PROTECT MOTOR FROM PRESSURE SURGES AND/OR CAVITATION.

**44** CASE OUTLET FLOW LINE MUST BE UNRESTRICTED AND SIZED SUCH THAT CASE PRESSURE AT MOTOR NEVER EXCEEDS 25 PSI MAX. EITHER OR BOTH CASE OUTLETS MAY BE USED.

**45** INTERMITTENT (15 MINUTES OR LESS) UNLOADED RUNNING IS PERMITTED AFTER PROPER START AND WARM UP, TO 50 RPM.

**46** CASE OUTLET FLOW MUST BE CHECKED FOR MINIMUM OF .05 GPM UNDER ANY CONDITION. IF NECESSARY, CASE FLOW MAY BE INCREASED BY BACK-PRESSURE AT THE MOTOR OUTLET PORT, OR USE OF LOWER VISCOSITY FLUID OR HIGHER FLUID TEMPERATURE.

**47** THERMAL SHOCKS IN EXCESS OF 50 FAHRENHEIT DEGREES ARE NOT RECOMMENDED. WHEN MOTOR IS COLD AND OIL IS HOT, START AND STOP MOTOR UNTIL TEMPERATURES ARE EQUALIZED. CASE FLOW MUST BE PRESENT.

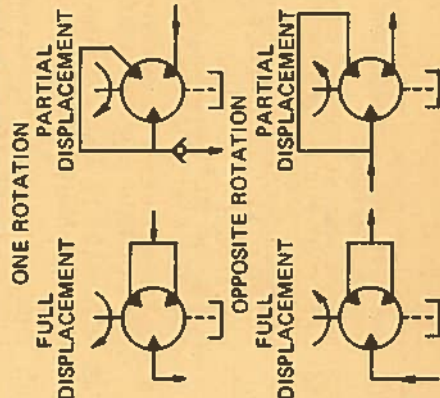
**48** FOR MULTI-TORQUE AND MULTI-SPEED OPERATION IT IS PREFERRED THAT THE "B" SINGLE PORT BODY BE USED AS INLET. IF BI-DIRECTIONAL ROTATION IS REQUIRED, USE THE "B" PORT FOR PRIMARY DIRECTION OF ROTATION. WHEN "B" PORT IS INLET THE IDLING "A" PORT MUST BE CONNECTED TO THE "B" PORT. SEE DIAGRAMS BELOW. "A1" AND "A2" PORT DISPLACEMENT IS 72 C.I.R. ON THE MHT-190/95/96 AND 94 C.I.R. ON MHT-250/125/126. ON A MHT-220/125/95 MOTOR THE "A1" PORT DISPLACEMENT IS 94 C.I.R. AND THE "A2" PORT IS 72 C.I.R. USE OF BOTH "A" PORTS GIVES MAXIMUM DISPLACEMENT OF EACH MODEL.

**NOTE:**  
IT IS GOOD PRACTICE TO LUBRICATE THE INTERNAL PARTS OF THESE NEW UNITS WITH HYDRAULIC FLUID BEFORE START-UP. ADD THE HYDRAULIC FLUID USED, TO THE INLET OR OUTLET OF THE MHT MOTORS PRIOR TO STARTING. FOR MORE COMPLETE INFORMATION ON START-UP, PLEASE CONTACT YOUR LOCAL SPERRY VICKERS REPRESENTATIVE.

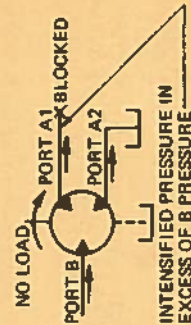
MODEL CODE	F3 - MHT 250 - ** - 30	DESIGN NUMBER
SPECIAL SEALS SEE FLUIDS AND SEALS NOTE.		SUBJECT TO CHANGE. INSTALLATION DIMENSIONS REMAIN AS SHOWN FOR DESIGN NUMBERS 20 THRU 29.
HIGH TORQUE LOW SPEED VANE MOTOR		SHAFT TYPE R1 = STANDARD SOLID SHAFT N1 = NO SHAFT
THEORETICAL OUTPUT TORQUE LB. FT./100 Δ PSI (SEE PAGE 1 FOR STANDARD AND MULTI-TORQUE MODELS)		

#### STANDARD GRAPHICAL SYMBOLS

MOTOR INSTALLATION POSSIBILITIES FOR FULL AND PARTIAL DISPLACEMENT AND BOTH DIRECTIONS OF ROTATION.



**CAUTION:** AVOID CIRCUITS WHERE ANY CONDITIONS COULD CAUSE INTENSIFIED PRESSURE. MULTI-DISPLACEMENT MOTORS LIKE CYLINDERS CAN EXPERIENCE INTENSIFIED PRESSURES UNDER SOME CIRCUIT CONDITIONS SUCH THAT PRESSURES WILL EXCEED THE MOTOR, PIPING OR VALVE RATING. EXAMPLE:



**NOTE:** USE OF CHECK VALVE DEPENDS ON CIRCUIT NEEDS.







## GENERAL DATA

THE MHT 500 SERIES MOTORS ARE HIGH-TORQUE LOW-SPEED VANE MOTORS. THEY ARE CAPABLE OF SMOOTH SPEEDS THROUGHOUT THEIR ENTIRE PRESSURE AND SPEED RANGES. THEY WILL PERFORM EQUALLY WELL IN EITHER DIRECTION OF ROTATION.

THE MHT 500, 440 & 380-30 PROVIDE A SINGLE DISPLACEMENT, ONE SPEED AND ONE TORQUE FOR A GIVEN FLOW AND PRESSURE.

THE MHT 500/250/250, MHT 440/250/190 AND MHT 380/190/190 ARE MULTI-TORQUE MOTORS. THE MULTI-DISPLACEMENT FEATURE PROVIDES FOR SELECTION OF TWO OR THREE SPEED OPERATIONS FOR A GIVEN FLOW, AND TWO OR THREE TORQUE CAPACITIES CORRESPONDING TO THE SPEEDS. SEE RATINGS BELOW AND ITEM 49.

## ROTATION

FLUID TO PORTS "A" GIVES CW ROTATION.

FLUID TO PORT "B" GIVES CCW ROTATION.

## RATINGS

NOMINAL SIZE	500	440	380	250	190
THEORETICAL DISPLACEMENT (IN. <sup>3</sup> /REV.)	376	332	288	188	144
THEORETICAL OUTPUT TORQUE PER 100 PSI DIFFERENTIAL (LB. FT.)	500	440	380	250	190

CASE PORT PRESSURE (PSI) MAX. . . . . 0-25

MAXIMUM ROTATING PRESSURE. . . . . 2000 PSI

MAXIMUM SPEED AT 2000 PSI DIFFERENTIAL. . . . . 150 RPM

MAXIMUM BREAKAWAY PRESSURE (STALL-NO ROTATION). . . . . 2750 PSI

MAXIMUM PRESSURE TO INLET OR OUTLET PORT. . . . . 2750 PSI

MAXIMUM SUM OF PRESSURE AT INLET & OUTLET PORTS. . . . . 2750 PSI

PERFORMANCE DATA FOR SPECIFIC APPLICATIONS AVAILABLE ON REQUEST FROM YOUR SPERRY VICKERS APPLICATION ENGINEER.

APPROXIMATE INERTIA OF MHT ROTATING GROUP

WITHOUT SHAFT. . . . . 1880 LB.-IN.<sup>2</sup>

WITH SHAFT. . . . . 2117 LB.-IN.<sup>2</sup>

BEARING CAPACITY (RADIAL OR AXIAL). . . . . 12520 LBS. AFBMA @ 33 1/3 RPM.

500 HOURS @ 10 LIFE, 6000 LBS. @ 50 RPM, 15000 HOURS AVERAGE LIFE (UNRELATED TO MOTOR LIFE).

WEIGHT LBS. (APPROX.) SHAFTLESS. . . . . 630

WITH SHAFT. . . . . 730

UNITS AT FULL DISPLACEMENT MAY BE USED AS A BRAKE WITHIN MOTOR RATINGS.

INLET SUPERCHARGE SHOULD BE AT LEAST 100 PSI, ESPECIALLY ABOVE 100 RPM,

TO PREVENT CAVITATION. PARTIAL DISPLACEMENT BRAKING IS NOT APPROVED.

WEIGHT LBS. (APPROX.) SHAFTLESS. . . . . 630

WITH SHAFT. . . . . 730

MOTOR HOUSING WILL ACCEPT NO AXIAL LOADING EXCEPT AT 13.50 DIA. BOLT

CIRCLE.

CUSTOMER MOUNTING SURFACE SHALL BE FLAT WITHIN .001 IN. AND PERPEN-

DICULAR TO AXIS WITHIN .001 TIR.

THE SPLINED ROTOR WILL NOT ACCEPT ANY SHAFT-TRANSLATION, (SLIDING

AXIALLY THRU SPLINE), WHEN MOTOR IS LOADED (PRODUCING TORQUE).

IF THE SHAFT MUST ABSORB AXIAL FORCES, PRELOADING MAY BE REQUIRED

TO PREVENT ANY TRANSLATION. (CONSULT SPERRY VICKERS APPLICATION

ENGINEER.)

IF THE APPLICATION REQUIRES THE MOUNTING FACE TO BE SEALED, AN AREA

HAS BEEN PROVIDED FOR USE WITH A 11.00 ID "O" RING SUCH AS SPERRY

VICKERS P/N 199838 OR EQUIVALENT.

MOTORS MAY BE SUPPLIED WITH THREADS DRILLED OUT OF MOUNTING SUR-

FACE BODY FOR THROUGH MOUNTING WITH STANDARD STUDS OR SCREWS. IF

REQUIRED, THRU SCREWS MUST BE TORQUED TO 150 ± 15 LB. FT. OILED THRU

STUDS OR SCREWS NOT FURNISHED. S13 - THREADS DRILLED FROM SHAFT

END BODY; S18 - FROM HEAD END BODY.

CONVENTIONAL MOUNTING IS WITH SIX SCREWS THRU BACK OF MOUNTING

PLATE, 1.50 MAX. INTO MOTOR. TORQUE TO 70-80 LB.-FT. OILED.

MOTOR MOUNTING ORIENTATION IS UNRESTRICTED AS TO PORT LOCATION

AND MOUNTING FACE. THE SHAFT MAY PROTRUDE FROM EITHER BODY.

PILOT MUST BE A NON-BINDING SLIP FIT, AND SHALL NOT EXCEED .230 MAX.

INTO MOTOR.

THESE 30 DESIGN MOTORS CAN BE MADE INTERCHANGEABLE WITH PRECEDING

DESIGNS. SEE DESIGN ASSISTANCE SKETCH 23267-K.

DOWEL HOLES .750 DIA. - 1.00 DEEP MAY BE ADDED BY CUSTOMER AT ANY TWO

(180° APART) OF THESE SIX MOUNTING HOLES IF REQUIRED, ON EITHER BODY.

ROTOR SPLINES MUST BE KEPT IN FACTORY ALIGNMENT. DO NOT ROTATE ONE

WITH RESPECT TO THE OTHER.

PILOT MUST BE A NON-BINDING SLIP FIT AND SHALL NOT EXCEED .130 MAXIMUM

INTO MOTOR.

SHAFT DATA

22 CUSTOMER SHAFT DESIGN MUST PROVIDE SPLINE GREASE RETENTION. SPLINE

IS NOT LUBRICATED BY SYSTEM FLUID. CUSTOMER SHAFT NEEDS NO SHAFT

SEAL SURFACE FOR SYSTEM FLUID RETENTION.

SHAFT SPLINE MUST SLIP FIT INTO ROTORS.

SHAFT SPLINE DATA -

EXTERNAL INVOLUTE SPLINE

FILLET ROOT - SIDE FIT

PITCH DIA. - 4.8000 REF.

BASE DIA. - 4.1569 REF.

NO. OF TEETH - 48

DIAMETRAL PITCH - 10/20

PRESSURE ANGLE - 30°

FORM DIA. - 4.6904

MAJOR DIA. - 4.9000/4.8950

MINOR DIA. - 4.6200/4.6050

FILLET RADII - .040 REF.

CIRCULAR TOOTH THICKNESS -

.1517 MAX. ACT. REF.

.1501 MIN. ACT.

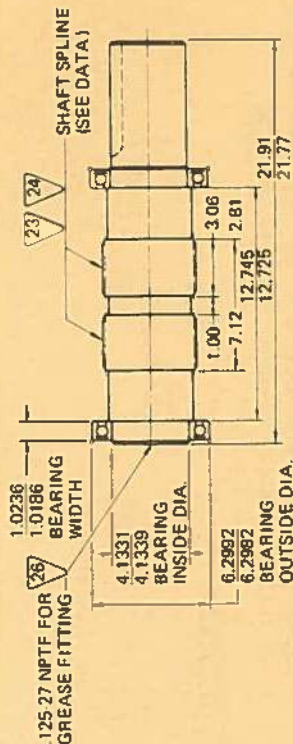
.1538 MAX. EFF.

.1522 MIN. EFF. REF.

MEASUREMENT OVER .1920 PINS:

5.0916 MAX. REF.

5.0890 MIN. REF.



WHEN DISASSEMBLING OR INSTALLING A SHAFT, THERE SHALL BE NO BINDING

AND NO AXIAL FORCE APPLIED TO THE ROTOR.

25 WITH A SHAFTLESS ASSEMBLY, THE CUSTOMER SHAFT SHALL PROVIDE ITS

OWN BEARINGS, AND CENTER THE ROTOR WITH .004 TIR CONCENTRICITY TO

THE PILOT DIAMETERS.



26

THE SHAFT SPLINE SHOULD BE PACKED WITH FIBROUS WHEEL-BEARING GREASE AT SIX MONTH INTERVALS, OR SOONER IF OPERATION IS AT HIGH TEMPERATURE. A STANDARD 1/8 NPTF GREASE FITTING IS INSTALLED IN THE TOP CENTER SECTION FOR THIS PURPOSE. ALSO A STANDARD 1/8 NPT GREASE FITTING MAY BE INSTALLED AT THE END OF THE SHAFT, FOR THE SAME PURPOSE.

27

A-GOVER MAY BE MADE TO SEAL-OFF-SHAFTLESS-MODELS-AT THIS LOCATION. SEE DESIGN ASSISTANCE SKETCH NO. 23263-K. THIS COVER HAS PROVISION FOR A 1/8 NPTF GREASE FITTING. USE WITH "O" RING P/N 154057 AND SNAP RING 354386 OR EQUIVALENT. (COVER 23263-K NOT MANUFACTURED BY SPERRY VICKERS - FOR CUSTOMER INFORMATION ONLY.)

28

IF CUSTOMER INSTALLATION USES NO BEARINGS IN THE MOTOR, SPLINE GREASE RETENTION MAY BE OBTAINED BY USING A SHAFT SEAL ADAPTER MOUNTED IN THE BEARING BORE WITH "O" RING 154057 AND SNAP RING 354386 OR EQUIVALENT. SEE DESIGN ASSISTANCE SKETCH 23262-K FOR ADAPTER. SUGGESTED SHAFT SEAL SIZE 4.125 ID (ADAPTER 23262-K NOT MANUFACTURED BY SPERRY VICKERS - FOR CUSTOMER INFORMATION ONLY.)

# CIRCUIT

41

**FLUIDS**  
**PETROLEUM OILS** - SELECT ANTIWEAR TYPE INDUSTRIAL HYDRAULIC OILS OR AUTOMOTIVE CRANKCASE OILS WITH A NOMINAL VISCOSITY OF 150 TO 315 SUS AT 100° F. AND HAVING LETTER DESIGNATION "SC, SD, OR SE" PER SAE TECHNICAL REPORT J183a. OPERATING VISCOSITY RANGE IS 70 TO 250 SUS. OPERATING TEMPERATURE OF 120° F. TYPICAL TO 180° F. MAXIMUM IS RECOMMENDED. REFER TO DATA SHEET 1-286-S (SECTION L) FOR HYDRAULIC OIL RECOMMENDATIONS.

**WATER-CONTAINING FLUIDS** - WATER GLYCOLS (NOT WATER-IN-OIL EMULSIONS) AS PRODUCED BY RESPONSIBLE SOURCES FOR RATINGS GIVEN HEREIN, ARE RECOMMENDED. SELECT FLUIDS WITH A VISCOSITY-AS CLOSE AS POSSIBLE TO THAT OF PETROLEUM OIL DESCRIBED ABOVE. IT IS RECOMMENDED THAT TEMPERATURES FOR WATER BASE FLUIDS BE LIMITED TO A MAXIMUM OF 130° F.

**SYNTHETIC FIRE RESISTANT FLUIDS** - PHOSPHATE ESTERS AND BLENDS AS PRODUCED BY RESPONSIBLE SOURCES FOR RATINGS GIVEN HEREIN ARE RECOMMENDED. SELECT FLUIDS WITH VISCOSITY AS CLOSE AS POSSIBLE TO THAT FOR PETROLEUM OIL DESCRIBED ABOVE. THE FLUID MUST BE COMPATIBLE WITH SEALS OF FLUOROCARBON AND SILICONE ELASTOMERS. (I.E. VITON, ETC.). TO OBTAIN MOTORS EQUIPPED FOR OPERATION WITH SYNTHETIC FIRE RESISTANT FLUIDS, ADD THE PREFIX "F3" TO THE MODEL NUMBER.

42 FLUID FILTRATION. . . . . 35 MICRONS ABSOLUTE OR FINER

43 CIRCUIT DESIGN SHOULD PROTECT MOTOR FROM PRESSURE SURGES AND/OR CAVITATION.

44

CASE OUTLET FLOW LINE MUST BE UNRESTRICTED AND SIZED SUCH THAT CASE PRESSURE AT MOTOR NEVER EXCEEDS 25 PSI MAX. EITHER OR BOTH CASE OUTLETS MAY BE USED. LEAVE OTHER PLUGGED.

45 INTERMITTENT (15 MINUTES OR LESS) UNLOADED RUNNING IS PERMITTED AFTER PROPER START AND WARM UP, TO 50 RPM.

46

CASE OUTLET FLOW MUST BE UNRESTRICTED AND MUST BE CHECKED FOR MINIMUM OF 10 GPM. IF NECESSARY, CASE FLOW MAY BE INCREASED BY BACK-PRESSURE AT THE MOTOR OUTLET PORT, OR USE LOWER VISCOSITY FLUID OR HIGHER FLUID TEMPERATURE.

47

THERMAL SHOCKS IN EXCESS OF 50° F. ARE NOT RECOMMENDED. WHEN MOTOR IS COLD AND OIL IS HOT, START AND STOP MOTOR UNTIL TEMPERATURES ARE EQUALIZED. CASE FLOW MUST BE PRESENT.

48

NOTE: IT IS GOOD PRACTICE TO LUBRICATE THE INTERNAL PARTS OF THESE NEW UNITS WITH HYDRAULIC FLUID BEFORE START-UP. ADD THE HYDRAULIC FLUID USED TO THE INLET OUTLET OF THE MHT MOTORS PRIOR TO STARTING. FOR MORE COMPLETE INFORMATION ON START-UP, PLEASE CONTACT YOUR LOCAL SPERRY VICKERS REPRESENTATIVE.

49

FOR MULTI-TORQUE AND MULTI-SPEED OPERATION IT IS PREFERRED THAT THE "B" SINGLE PORT BODY BE USED AS INLET. IF BI-DIRECTIONAL ROTATION IS REQUIRED, USE THE "B" PORT FOR PRIMARY DIRECTION OF ROTATION. WHEN "B" PORT IS INLET THE IDLING "A" PORT MUST BE CONNECTED TO THE "B" PORT. SEE DIAGRAMS BELOW ON THE MHT-440/250/190 MODEL FLUID THRU PORT "A1" GIVES 188 IN. 3/REV. DISPLACEMENT WHILE FLUID THRU PORT "A2" GIVES 144 IN. 3/REV. DISPLACEMENT. SEE SCHEMATIC BELOW.

## MODEL CODE

HIGH TORQUE LOW SPEED VANE MOTOR	MHT - 500/250/250 - ** - 30	DESIGN NUMBER SUBJECT TO CHANGE IN- STALLATION DIMENSIONS REMAIN AS SHOWN FOR DESIGN NUMBERS 30 THRU 39.
THEORETICAL OUTPUT TORQUE LB. FT./100 ΔPSI		SHAFT TYPE H1 = STANDARD SOLID SHAFT N1 = NO SHAFT
500 STD. SERIES		
440 STD. SERIES		
380 STD. SERIES		
500/250/250 MULTI-TORQUE SERIES		
440/250/190 MULTI-TORQUE SERIES		
380/190/190 MULTI-TORQUE SERIES		

## STANDARD GRAPHICAL SYMBOLS FOR FLUID POWER DIAGRAMS

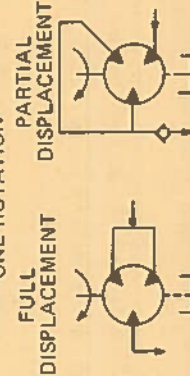


STANDARD MOTOR

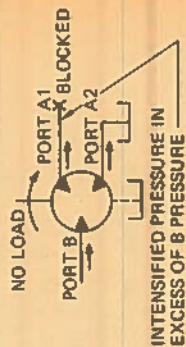
## MULTI-TORQUE MOTORS

MOTOR INSTALLATION POSSIBILITIES FOR FULL AND PARTIAL DISPLACEMENT AND BOTH DIRECTIONS OF ROTATION.

ONE ROTATION



NOTE: USE OF CHECK VALVE DEPENDS ON CIRCUIT NEEDS.



CAUTION: AVOID CIRCUITS WHERE ANY CONDITIONS COULD CAUSE INTENSIFIED PRESSURE. MULTI-DISPLACEMENT MOTORS LIKE CYLINDERS, CAN EXPERIENCE INTENSIFIED PRESSURES UNDER SOME CIRCUIT CONDITIONS SUCH THAT PRESSURES WILL EXCEED THE MOTOR, PIPING OR VALVE RATING. EXAMPLE AT RIGHT:







# GENERAL DATA

THE MHT 750 SERIES MOTORS ARE HIGH-TORQUE LOW-SPEED VANE MOTORS. THEY ARE CAPABLE OF SMOOTH SPEEDS THROUGHOUT THEIR ENTIRE PRESSURE AND SPEED RANGES. THEY WILL PERFORM EQUALLY WELL IN EITHER DIRECTION OF ROTATION.

THE MHT 750 PROVIDES A SINGLE DISPLACEMENT, ONE SPEED AND ONE TORQUE FOR A GIVEN FLOW AND PRESSURE.

THE MHT750/375/375 IS A MULTI-TORQUE MOTOR. THE MULTI-DISPLACEMENT FEATURE PROVIDES FOR SELECTION OF TWO OR THREE SPEED OPERATIONS FOR A GIVEN FLOW, AND TWO OR THREE TORQUE CAPACITIES CORRESPONDING TO THE SPEEDS. SEE RATINGS BELOW AND ITEM 49.

## ROTATION

FLUID TO PORTS "A" GIVES CW ROTATION.  
FLUID TO PORT "B" GIVES CCW ROTATION.

## RATINGS

NOMINAL SIZE		
THEORETICAL DISPLACEMENT (IN. <sup>3</sup> /REV.)	750	375
THEORETICAL OUTPUT TORQUE PER 100 PSI DIFFERENTIAL (LB. FT.)	565	283
	750	375

CASE PORT PRESSURE (PSI) MAX. . . . . 0.25  
MAXIMUM ROTATING PRESSURE. . . . . 2000 PSI  
MAXIMUM SPEED AT 2000 PSI DIFFERENTIAL. . . . . 100 RPM  
MAXIMUM BREAKAWAY PRESSURE (STALL NO. ROTATION). . . . . 2750 PSI  
MAXIMUM PRESSURE TO INLET OR OUTLET PORT. . . . . 2750 PSI  
MAXIMUM SUM OF PRESSURE AT INLET & OUTLET PORTS. . . . . 2750 PSI  
PERFORMANCE DATA FOR SPECIFIC APPLICATIONS AVAILABLE ON REQUEST FROM YOUR SPERRY VICKERS APPLICATION ENGINEER.

## BEARING DATA

BEARING CAPACITY (RADIAL OR AXIAL). . . . . 12520 LBS. AFBMA @ 33-1/3 RPM,  
500 HOURS B-10 LIFE, 6000 LBS. @ 50 RPM,  
15000 HOURS AVERAGE LIFE.

APPROXIMATE INERTIA OF ROTATING GROUP  
WITHOUT SHAFT. . . . . 2820 LB.-IN.<sup>2</sup>  
WITH SHAFT. . . . . 3117 LB.-IN.<sup>2</sup>

## BRAKING

UNITS AT FULL DISPLACEMENT MAY BE USED AS A BRAKE WITHIN MOTOR RATINGS. INLET SUPERCHARGE SHOULD BE AT LEAST 100 PSI, ESPECIALLY ABOVE 50 RPM, TO PREVENT CAVITATION. PARTIAL DISPLACEMENT BRAKING IS NOT APPROVED.

WEIGHT LBS. (APPROX.) SHAFTLESS. . . . . 788  
WITH SHAFT. . . . . 920

## MOUNTING

1 MOTOR HOUSING WILL ACCEPT NO AXIAL LOADING EXCEPT AT 13.50 DIA. BOLT CIRCLE.

2 CUSTOMER MOUNTING SURFACE SHALL BE FLAT WITHIN .001 IN. AND PERPENDICULAR TO AXIS WITHIN .001 TIR.

3 THE SPLINED ROTOR WILL NOT ACCEPT ANY SHAFT TRANSLATION, (SLIDING AXIALLY THRU SPLINE), WHEN MOTOR IS LOADED (PRODUCING TORQUE).

4 IF THE SHAFT MUST ABSORB AXIAL FORCES, PRELOADING MAY BE REQUIRED TO PREVENT ANY TRANSLATION. (CONSULT SPERRY VICKERS APPLICATION ENGINEER.)

5 IF THE APPLICATION REQUIRES THE MOUNTING FACE TO BE SEALED, AN AREA HAS BEEN PROVIDED FOR USE WITH A 11.00 ID "O" RING SUCH AS SPERRY VICKERS P/N 199838 OR EQUIVALENT.

6 MOTORS MAY BE SUPPLIED WITH THREADS DRILLED OUT OF MOUNTING SURFACE BODY FOR THROUGH MOUNTING WITH STANDARD STUDS OR SCREWS. IF REQUIRED, THRU SCREWS MUST BE TORQUED TO 150 ±15 LB. FT. OILED THRU

STUDS OR SCREWS NOT FURNISHED. S13 - THREADS DRILLED FROM SHAFT END BODY; S18 - FROM HEAD END BODY.

CONVENTIONAL MOUNTING IS WITH SIX SCREWS THRU BACK OF MOUNTING PLATE, 1.50 MAX. INTO MOTOR. TORQUE TO 70-80 LB. FT. OILED.

8 MOTOR MOUNTING ORIENTATION IS UNRESTRICTED AS TO PORT LOCATION AND MOUNTING FACE. THE SHAFT MAY PROTRUDE FROM EITHER BODY.

9 PILOT MUST BE A NON-BINDING SLIP FIT, AND SHALL NOT EXCEED .230 MAX. INTO MOTOR.

10 THESE 30 DESIGN MOTORS CAN BE MADE INTERCHANGEABLE WITH PRECEDING DESIGNS. SEE DESIGN ASSISTANCE SKETCH 23267-K.

11 DOWEL HOLES .750 DIA. 1.00 DEEP MAY BE ADDED BY CUSTOMER AT ANY TWO (180° APART) OF THESE SIX MOUNTING HOLES IF REQUIRED, ON EITHER BODY.

12 ROTOR SPLINES MUST BE KEPT IN FACTORY ALIGNMENT. DO NOT ROTATE ONE WITH RESPECT TO THE OTHER.

13 PILOT MUST BE A NON-BINDING SLIP FIT AND SHALL NOT EXCEED .130 MAXIMUM INTO MOTOR.

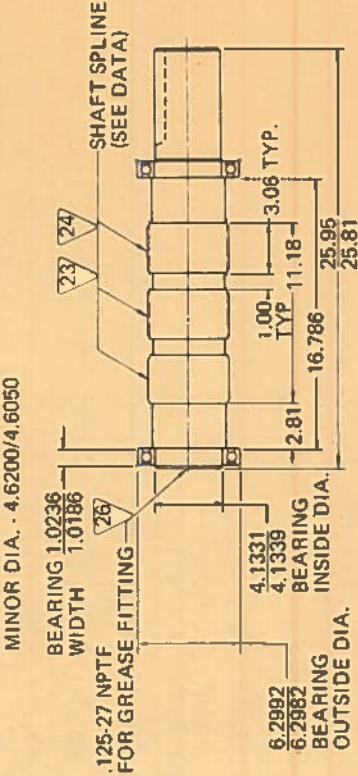
## SHAFT DATA

22 CUSTOMER SHAFT DESIGN MUST PROVIDE SPLINE GREASE RETENTION. SPLINE IS NOT LUBRICATED BY SYSTEM FLUID. CUSTOMER SHAFT NEEDS NO SHAFT SEAL SURFACE FOR SYSTEM FLUID RETENTION.

23 SHAFT SPLINE MUST SLIP FIT INTO ROTORS.

## SHAFT SPLINE DATA -

EXTERNAL INVOLUTE SPLINE  
FILLET ROOT - SIDE FIT  
PITCH DIA. 4.8000 REF.  
BASE DIA. 4.1569 REF.  
NO. OF TEETH - 48  
DIAMETRAL PITCH - 10/20  
PRESSURE ANGLE - 30°  
FORM DIA. 4.6904  
MAJOR DIA. 4.9000/4.8950  
MINOR DIA. 4.6200/4.6050  
FILLET RADIUS - .040 REF.  
CIRCULAR TOOTH THICKNESS  
1517 MAX. ACT. REF.  
1501 MIN. ACT.  
1538 MAX. EFF.  
1522 MIN. EFF. REF.  
MEASUREMENT OVER .1920 PINS:  
5.0916 MAX. REF.  
5.0890 MIN. REF.



24 WHEN DISASSEMBLING OR INSTALLING A SHAFT, THERE SHALL BE NO BINDING AND NO AXIAL FORCE APPLIED TO THE ROTOR.

25 WITH A SHAFTLESS ASSEMBLY, THE CUSTOMER SHAFT SHALL PROVIDE ITS OWN BEARINGS, AND CENTER THE ROTOR WITH .004 TIR CONCENTRICITY TO THE PILOT DIAMETERS.



26 THE SHAFT SPLINE SHOULD BE PACKED WITH FIBROUS WHEEL-BEARING GREASE AT SIX MONTH INTERVALS, OR SOONER IF OPERATION IS AT HIGH TEMPERATURE. STANDARD 1/8 NPTF GREASE FITTINGS ARE INSTALLED IN THE TOP SPACER SECTIONS FOR THIS PURPOSE. ALSO A STANDARD 1/8 NPT GREASE FITTING MAY BE INSTALLED AT THE END OF THE SHAFT, FOR THE SAME PURPOSE.

27 A COVER MAY BE MADE TO SEAL OFF SHAFTLESS MODELS AT THIS LOCATION. SEE DESIGN ASSISTANCE SKETCH NO. 23263-K. THIS COVER HAS PROVISION FOR A 1/8 NPTF GREASE FITTING. USE WITH "O" RING PIN 154057 AND SNAP RING 354386 OR EQUIVALENT. (COVER 23263-K NOT MANUFACTURED BY SPERRY VICKERS - FOR CUSTOMER INFORMATION ONLY.)

28 IF CUSTOMER INSTALLATION USES NO BEARINGS IN THE MOTOR, SPLINE GREASE RETENTION MAY BE OBTAINED BY USING A SHAFT SEAL ADAPTER MOUNTED IN THE BEARING BORE WITH "O" RING 154057 AND SNAP RING 354386 OR EQUIVALENT. SEE DESIGN ASSISTANCE SKETCH 23262-K FOR ADAPTER. SUGGESTED SHAFT SEAL SIZE 4.125 ID (ADAPTER 23262-K NOT MANUFACTURED BY SPERRY VICKERS - FOR CUSTOMER INFORMATION ONLY.)

#### CIRCUIT

41 **FLUIDS**  
PETROLEUM OILS - SELECT ANTIWEAR TYPE INDUSTRIAL HYDRAULIC OILS OR AUTOMOTIVE CRANKCASE OILS WITH A NORMAL VISCOSITY OF 150 TO 315 SUS AT 100° F. AND HAVING LETTER DESIGNATION "SC, SD, OR SE" PER SAE TECHNICAL REPORT J183a. OPERATING VISCOSITY RANGE IS 70 TO 250 SUS. OPERATING TEMPERATURE OF 120° F. TYPICAL TO 180° F. MAXIMUM IS RECOMMENDED. REFER TO DATA SHEET 1-286-S (SECTION L) FOR HYDRAULIC FLUID AND TEMPERATURE RECOMMENDATIONS.

WATER-CONTAINING FLUIDS - WATER GLYCOLS (NOT WATER-IN-OIL EMULSIONS) AS PRODUCED BY RESPONSIBLE SOURCES FOR RATINGS GIVEN HEREIN ARE RECOMMENDED. SELECT FLUIDS WITH A VISCOSITY AS CLOSE AS POSSIBLE TO THAT OF PETROLEUM OIL DESCRIBED ABOVE. IT IS RECOMMENDED THAT TEMPERATURES FOR WATER-BASE FLUIDS BE LIMITED TO A MAXIMUM OF 130° F.

SYNTHETIC FIRE RESISTANT FLUIDS - PHOSPHATE ESTERS AND BLENDS AS PRODUCED BY RESPONSIBLE SOURCES FOR RATINGS GIVEN HEREIN ARE RECOMMENDED. SELECT FLUIDS WITH VISCOSITY AS CLOSE AS POSSIBLE TO THAT OF PETROLEUM OIL DESCRIBED ABOVE. THE FLUID MUST BE COMPATIBLE WITH SEALS OF FLUOROCARBON AND SILICONE ELASTOMERS. (I.E. VITON, ETC.). TO OBTAIN MOTORS EQUIPPED FOR OPERATION WITH SYNTHETIC FIRE RESISTANT FLUIDS, ADD THE PREFIX "F3" TO THE MODEL NUMBER.

42 FLUID FILTRATION..... 35 MICRONS ABSOLUTE OR FINER

43 CIRCUIT DESIGN SHOULD PROTECT MOTOR FROM PRESSURE SURGES AND/OR CAVITATION.

44 CASE OUTLET FLOW LINE MUST BE UNRESTRICTED AND SIZED SUCH THAT CASE PRESSURE AT MOTOR NEVER EXCEEDS 25 PSI MAX. EITHER OR BOTH CASE OUTLETS MAY BE USED. LEAVE OTHER PLUGGED.

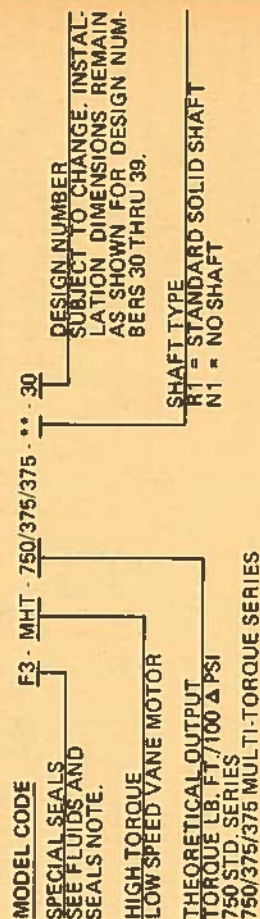
45 INTERMITTENT (15 MINUTES OR LESS) UNLOADED RUNNING IS PERMITTED AFTER PROPER START AND WARM UP, TO 50 RPM.

46 IF APPLICATION REQUIRES MOTOR TO RUN UNLOADED, CASE OUTLET FLOW MUST BE UNRESTRICTED AND MUST BE CHECKED FOR MINIMUM OF .10 GPM. IF NECESSARY, CASE FLOW MAY BE INCREASED BY BACK PRESSURE AT THE MOTOR OUTLET PORT, OR USE LOWER VISCOSITY FLUID OR HIGHER FLUID TEMPERATURE.

47 THERMAL SHOCKS IN EXCESS OF 50° F. ARE NOT RECOMMENDED. WHEN MOTOR IS COLD AND OIL IS HOT, START AND STOP MOTOR UNTIL TEMPERATURES ARE EQUALIZED. CASE FLOW MUST BE PRESENT.

48 **NOTE:** IT IS GOOD PRACTICE TO LUBRICATE THE INTERNAL PARTS OF THESE NEW UNITS WITH HYDRAULIC FLUID BEFORE START-UP. ADD THE HYDRAULIC FLUID USED, TO THE INLET, OUTLET, OF THE MHT MOTORS PRIOR TO STARTING. FOR MORE COMPLETE INFORMATION ON START-UP, PLEASE CONTACT YOUR LOCAL SPERRY VICKERS REPRESENTATIVE.

49 FOR MULTI-TORQUE AND MULTI-SPEED OPERATION IT IS PREFERRED THAT THE "B" SINGLE PORT BODY BE USED AS INLET. IF BI-DIRECTIONAL ROTATION IS REQUIRED, USE THE "B" PORT FOR PRIMARY DIRECTION OF ROTATION. WHEN "B" PORT IS INLET THE IDLING "A" PORT MUST BE CONNECTED TO THE "B" PORT. SEE DIAGRAMS BELOW.

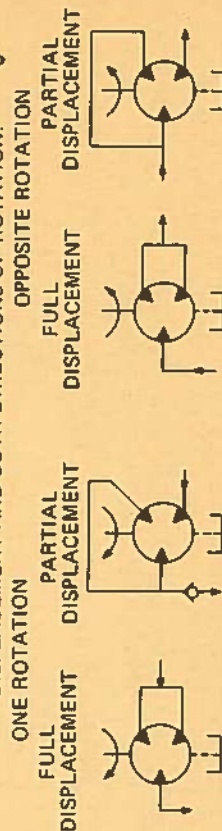


#### STANDARD GRAPHICAL SYMBOLS FOR FLUID POWER DIAGRAMS



#### MULTI-TORQUE MOTORS

MOTOR INSTALLATION POSSIBILITIES FOR FULL AND PARTIAL DISPLACEMENT AND BOTH DIRECTIONS OF ROTATION.



NOTE: USE OF CHECK VALVE DEPENDS ON CIRCUIT NEEDS.





# **HYDRAULIC VANE MOTORS**

MODEL SERIES MHT-1000-\*\*-30  
HIGH TORQUE - LOW SPEED  
FIXED DISPLACEMENT

THE NUMBERED TRIANGLES POINT OUT AREAS OF THE MOTORS WHERE SPECIFIC INFORMATION IS KEYS ON PAGES 520280-1 AND -2.

750-10 UNC-2B MOUNTING HOLES  
6 PLACES EQUALLY SPACED AS SHOWN  
MOUNTING SCREW PENETRATION  
1.50 MAX. TORQUE TO 70-80 LB.-FT. OILED

750-10 UNC-2A STUDS 20.75 LONG  
6 PLACES EQUALLY SPACED  
AS SHOWN FROM EACH SIDE

15° REF.

15° REF.

15° REF.

15° REF.

15° REF.

15° REF.

15° REF.

15° REF.

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15° REF.

**SPERRY VICKERS**  
T.M.  
TROY, MICHIGAN 48084

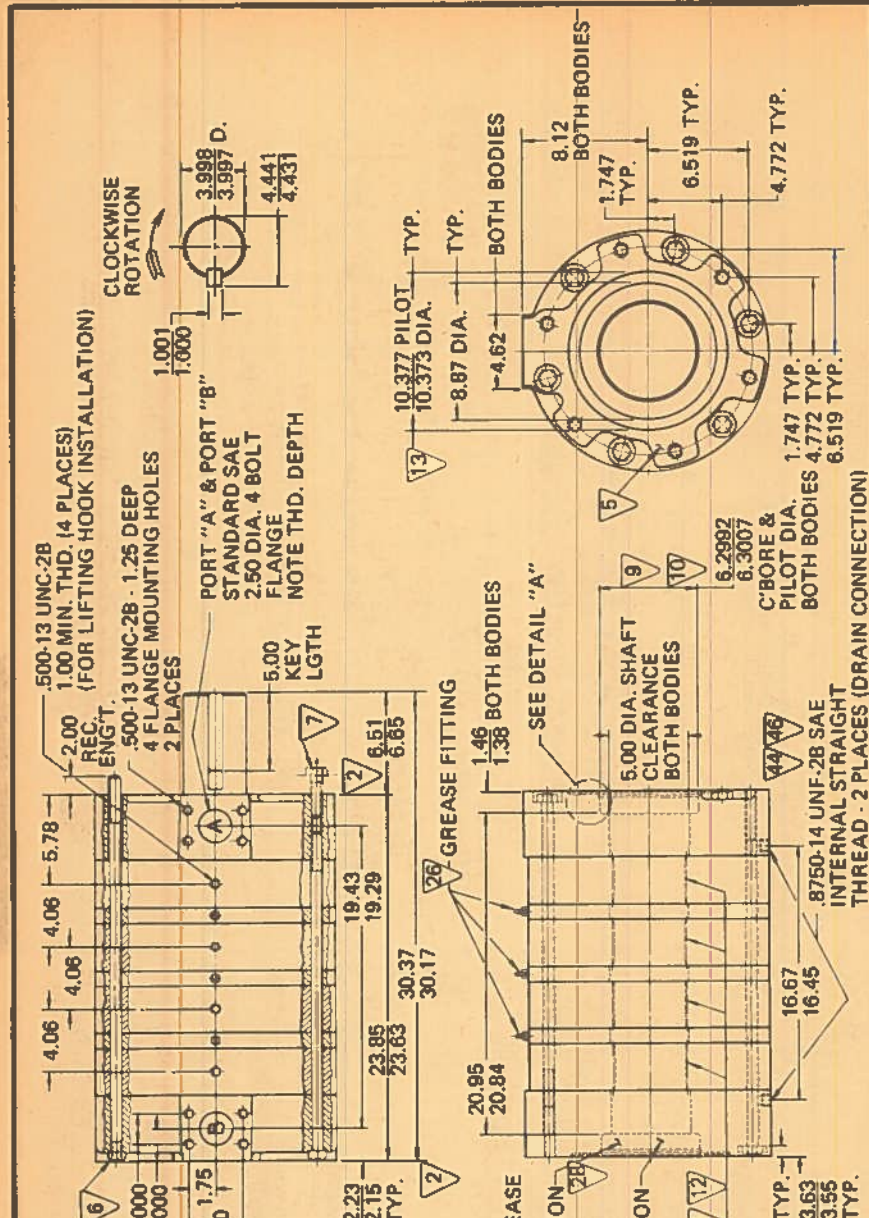
VANE MOTORS  
HIGH TORQUE  
LOW SPEED

THEORETICAL TORQUE  
SINGLE 1000 LB. FT.  
MULTI 1000 & 500 LB. FT.

THEORETICAL DISPLACEMENT  
SINGLE 754 CU. IN./REV.  
MULTI 754 & 377 CU. IN./REV.

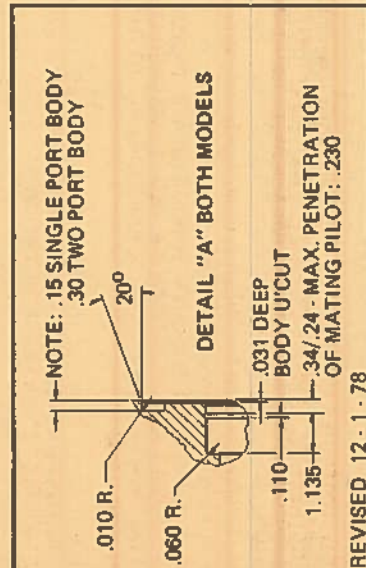
SPEED  
RANGE  
0-100

DWG. NO.  
520280



## **HYDRAULIC VANE MOTORS MULTI-TORQUE**

MODEL SERIES MHT-1000/500-\*\*-30  
HIGH TORQUE - LOW SPEED MULTI FIXED DISPLACEMENT





## GENERAL DATA

THE MHT 1000 SERIES MOTORS ARE HIGH-TORQUE LOW-SPEED VANE MOTORS. THEY ARE CAPABLE OF SMOOTH SPEEDS THROUGHOUT THEIR ENTIRE PRESSURE AND SPEED RANGES. THEY WILL PERFORM EQUALLY WELL IN EITHER DIRECTION OF ROTATION.

THE MHT 1000 PROVIDES A SINGLE DISPLACEMENT, ONE SPEED AND ONE TORQUE FOR A GIVEN FLOW AND PRESSURE.

THE MHT-1000/500/500 IS A MULTI-TORQUE MOTOR. THE MULTI-DISPLACEMENT FEATURE PROVIDES FOR SELECTION OF TWO SPEED OPERATION FOR A GIVEN FLOW, AND TWO TORQUE CAPACITIES CORRESPONDING TO THE SPEEDS. SEE RATINGS BELOW AND ITEM 49.

## ROTATION

FLUID TO PORTS "A" GIVES CW ROTATION.  
FLUID TO PORT "B" GIVES CCW ROTATION.

## RATINGS

	NOMINAL SIZE	
	1000	500
THEORETICAL DISPLACEMENT (IN. 3/REV.)	754	377
THEORETICAL OUTPUT TORQUE PER 100 PSI DIFFERENTIAL (LB. FT.)	1000	500

CASE PORT PRESSURE (PSI) MAX. .... 0-25  
MAXIMUM ROTATING PRESSURE. .... 2000 PSI  
MAXIMUM SPEED AT 2000 PSI DIFFERENTIAL. .... 100 RPM  
MAXIMUM BREAKAWAY PRESSURE (STALL-NO ROTATION). .... 2750 PSI  
MAXIMUM PRESSURE TO INLET OR OUTLET PORT. .... 2750 PSI  
MAXIMUM SUM OF PRESSURE AT INLET & OUTLET PORTS. .... 2750 PSI  
PERFORMANCE DATA FOR SPECIFIC APPLICATIONS AVAILABLE ON REQUEST FROM YOUR SPERRY VICKERS APPLICATION ENGINEER.

## BEARING DATA

BEARING CAPACITY (RADIAL OR AXIAL). .... 12520 LBS. AFBMA @ 33-1/3 RPM,  
500 HOURS B-10 LIFE, 6000 LBS. @ 50 RPM, 15000 HOURS AVERAGE LIFE (UNRELATED TO MOTOR LIFE).

## APPROXIMATE INERTIA OF ROTATING GROUP

WITHOUT SHAFT. .... 3760 LB.-IN. 2  
WITH SHAFT. .... 4115 LB.-IN. 2

## BRACKING

UNITS AT FULL DISPLACEMENT MAY BE USED AS A BRAKE WITHIN MOTOR RATINGS. INLET SUPERCHARGE SHOULD BE AT LEAST 100 PSI, ESPECIALLY ABOVE 50 RPM, TO PREVENT CAVITATION. PARTIAL DISPLACEMENT BRAKING IS NOT APPROVED.

WEIGHT LBS. (APPROX.) SHAFTLESS. .... 962  
WITH SHAFT. .... 1120

## MOUNTING

1 MOTOR HOUSING WILL ACCEPT NO AXIAL LOADING EXCEPT AT 13.50 DIA. BOLT CIRCLE.

2 CUSTOMER MOUNTING SURFACE SHALL BE FLAT WITHIN .001 IN. AND PERPENDICULAR TO AXIS WITHIN .001 TIR.

3 THE SPLINED ROTOR WILL NOT ACCEPT ANY SHAFT-TRANSLATION, (SLIDING AXIALLY THRU SPLINE), WHEN MOTOR IS LOADED (PRODUCING TORQUE).

4 IF THE SHAFT MUST ABSORB AXIAL FORCES, PRELOADING MAY BE REQUIRED TO PREVENT ANY TRANSLATION. (CONSULT SPERRY VICKERS APPLICATION ENGINEER.)

5 IF THE APPLICATION REQUIRES THE MOUNTING FACE TO BE SEALED, AN AREA HAS BEEN PROVIDED FOR USE WITH A 11.00 ID "O" RING SUCH AS SPERRY VICKERS P/N 199838 OR EQUIVALENT.

6 MOTORS MAY BE SUPPLIED WITH THREADS DRILLED OUT OF MOUNTING SURFACE BODY FOR THROUGH MOUNTING WITH STANDARD STUDS OR SCREWS. IF REQUIRED, THRU SCREWS MUST BE TORQUED TO 150 ±15 LB. FT. OILED, THRU

STUDS OR SCREWS NOT FURNISHED. S13 - THREADS DRILLED FROM SHAFT END BODY. S18 - FROM HEAD END BODY.

CONVENTIONAL MOUNTING IS WITH SIX SCREWS THRU BACK OF MOUNTING PLATE, 1.50 MAX. INTO MOTOR. TORQUE TO 70-80 LB.-FT. OILED.

MOTOR MOUNTING ORIENTATION IS UNRESTRICTED AS TO PORT LOCATION AND MOUNTING FACE. THE SHAFT MAY PROTRUDE FROM EITHER BODY.

PILOT MUST BE A NON-BINDING SLIP FIT, AND SHALL NOT EXCEED .230 MAX. INTO MOTOR.

THESE 30 DESIGN MOTORS CAN BE MADE INTERCHANGEABLE WITH PRECEDING DESIGNS. SEE DESIGN ASSISTANCE SKETCH 23267-K.

DOWEL HOLES .750 DIA. - 1.00 DEEP MAY BE ADDED BY CUSTOMER AT ANY TWO (180° APART) OF THESE SIX MOUNTING HOLES IF REQUIRED, ON EITHER BODY.

ROTOR SPLINES MUST BE KEPT IN FACTORY ALIGNMENT. DO NOT ROTATE ONE WITH RESPECT TO THE OTHER.

PILOT MUST BE A NON-BINDING SLIP FIT AND SHALL NOT EXCEED .130 MAXIMUM INTO MOTOR.

## SHAFT DATA

22 CUSTOMER SHAFT DESIGN MUST PROVIDE SPLINE GREASE RETENTION. SPLINE IS NOT LUBRICATED BY SYSTEM FLUID. CUSTOMER SHAFT NEEDS NO SHAFT SEAL SURFACE FOR SYSTEM FLUID RETENTION.

SHAFT SPLINE MUST SLIP FIT INTO ROTORS.

SHAFT SPLINE DATA -

## EXTERNAL INVOLUTE SPLINE

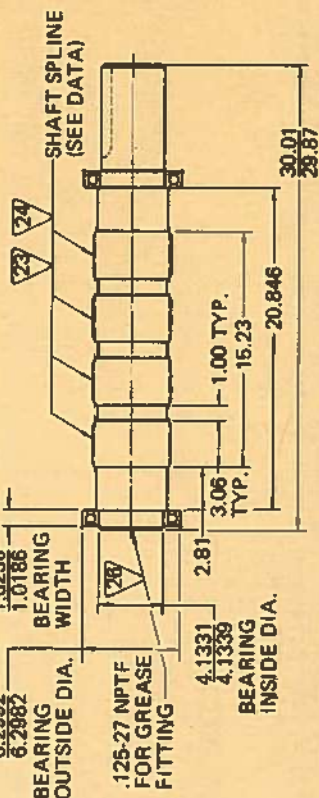
FILLET ROOT - SIDE FIT  
PITCH DIA. - 4.8000 REF.  
BASE DIA. - 4.1569 REF.

NO. OF TEETH - 48  
DIAMETRAL PITCH - 10/20  
PRESSURE ANGLE - 30°

FORM DIA. - 4.6904  
MAJOR DIA. - 4.9000/4.8950  
MINOR DIA. - 4.6200/4.6050

FILLET RADIUS - .040 REF.  
CIRCULAR TOOTH THICKNESS -  
.1517 MAX. ACT. REF.  
.1501 MIN. ACT.  
.1538 MAX. EFF.  
.1522 MIN. EFF. REF.

MEASUREMENT OVER .1920 PINS:  
5.0916 MAX. REF.  
5.0890 MIN. REF.



24 WHEN DISASSEMBLING OR INSTALLING A SHAFT, THERE SHALL BE NO BINDING AND NO AXIAL FORCE APPLIED TO THE ROTOR.

25 WITH A SHAFTLESS ASSEMBLY, THE CUSTOMER SHAFT SHALL PROVIDE ITS OWN BEARINGS, AND CENTER THE ROTOR WITH .004 TIR CONCENTRICITY TO THE PILOT DIAMETERS.



THE SHAFT SPLINE SHOULD BE PACKED WITH FIBROUS WHEEL-BEARING GREASE AT SIX MONTH INTERVALS, OR SOONER IF OPERATION IS AT HIGH TEMPERATURE. STANDARD 1/8 NPTF GREASE FITTINGS ARE INSTALLED IN THE TOP SPACER SECTIONS FOR THIS PURPOSE. ALSO A STANDARD 1/8 NPT GREASE FITTING MAY BE INSTALLED AT THE END OF THE SHAFT, FOR THE SAME PURPOSE.

A COVER MAY BE MADE TO SEAL OFF SHAFTLESS MODELS AT THIS LOCATION. SEE DESIGN ASSISTANCE SKETCH NO. 23263-K. THIS COVER HAS PROVISION FOR A 1/8 NPTF GREASE FITTING. USE WITH "O" RING P/N 154057 AND SNAP RING 354386 OR EQUIVALENT. (COVER 23263-K NOT MANUFACTURED BY SPERRY VICKERS - FOR CUSTOMER INFORMATION ONLY.)

IF CUSTOMER INSTALLATION USES NO BEARINGS IN THE MOTOR, SPLINE GREASE RETENTION MAY BE OBTAINED BY USING A SHAFT SEAL ADAPTER MOUNTED IN THE BEARING BORE WITH "O" RING 154057 AND SNAP RING 354386 OR EQUIVALENT. SEE DESIGN ASSISTANCE SKETCH 23262-K FOR ADAPTER. SUGGESTED SHAFT SEAL SIZE 4.125 ID (ADAPTER 23262-K NOT MANUFACTURED BY SPERRY VICKERS - FOR CUSTOMER INFORMATION ONLY.)

# CIRCUIT

FLUIDS - SELECT ANTIWEAR TYPE INDUSTRIAL HYDRAULIC OILS OR PETROLEUM OILS WITH A NORMAL VISCOSITY OF 150 TO 315 SUS AUTOMOTIVE CRANKCASE OILS WITH A VISCOSITY OF 150 TO 315 SUS AT 100° F. AND HAVING LETTER DESIGNATION "SC, SD, OR SE" PER SAE TECHNICAL REPORT J183a. OPERATING VISCOSITY RANGES TO 70 TO 250 SUS. OPERATING TEMPERATURE OF 120° F. TYPICAL TO 180° F. MAXIMUM IS RECOMMENDED. REFER TO DATA SHEET 1-286-S (SECTION L) FOR HYDRAULIC OIL RECOMMENDATIONS.

WATER-CONTAINING FLUIDS - WATER GLYCOLS (NOT WATER-IN-OIL EMULSIONS) AS PRODUCED BY RESPONSIBLE SOURCES FOR RATINGS GIVEN HEREIN, ARE RECOMMENDED. SELECT FLUIDS WITH A VISCOSITY AS CLOSE AS POSSIBLE TO THAT OF PETROLEUM OIL DESCRIBED ABOVE. IT IS RECOMMENDED THAT TEMPERATURES FOR WATER BASE FLUIDS BE LIMITED TO A MAXIMUM OF 130° F.

SYNTHETIC FIRE RESISTANT FLUIDS - PHOSPHATE ESTERS AND BLENDS AS PRODUCED BY RESPONSIBLE SOURCES FOR RATINGS GIVEN HEREIN ARE RECOMMENDED. SELECT FLUIDS WITH VISCOSITY AS CLOSE AS POSSIBLE TO THAT OF PETROLEUM OIL DESCRIBED ABOVE. THE FLUID MUST BE COMPATIBLE WITH SEALS OF FLUOROCARBON AND SILICONE ELASTOMERS. (I.E. VITON, ETC.). TO OBTAIN MOTORS EQUIPPED FOR OPERATION WITH SYNTHETIC FIRE RESISTANT FLUIDS, ADD THE PREFIX "F3" TO THE MODEL NUMBER.

FLUID FILTRATION. .... 35 MICRONS ABSOLUTE OR FINER  
CIRCUIT DESIGN SHOULD PROTECT MOTOR FROM PRESSURE SURGES AND/OR CAVITATION.

CASE OUTLET FLOW LINE MUST BE UNRESTRICTED AND SIZED SUCH THAT CASE PRESSURE AT MOTOR NEVER EXCEEDS 25 PSI MAX. EITHER OR BOTH CASE OUTLETS MAY BE USED. LEAVE OTHER PLUGGED.

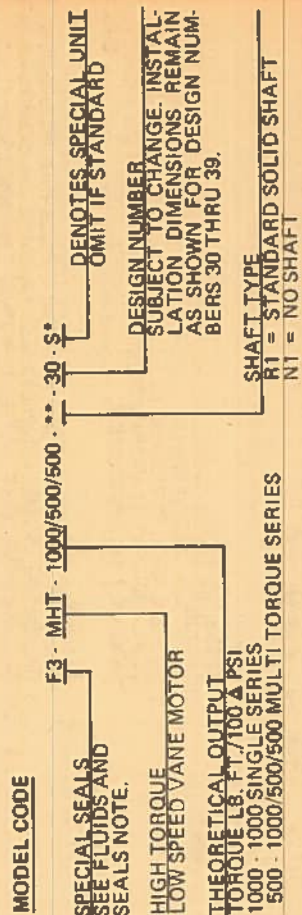
INTERMITTENT (15 MINUTES OR LESS) UNLOADED RUNNING IS PERMITTED AFTER PROPER START AND WARM UP, TO 50 RPM.

IF APPLICATION REQUIRES MOTOR TO RUN UNLOADED, CASE OUTLET FLOW MUST BE UNRESTRICTED AND MUST BE CHECKED FOR MINIMUM OF .10 GPM. IF NECESSARY, CASE FLOW MAY BE INCREASED BY BACK PRESSURE AT THE MOTOR OUTLET PORT, OR USE LOWER VISCOSITY FLUID OR HIGHER FLUID TEMPERATURE.

THERMAL SHOCKS IN EXCESS OF 50° F. ARE NOT RECOMMENDED. WHEN MOTOR IS COLD AND OIL IS HOT, START AND STOP MOTOR UNTIL TEMPERATURES ARE EQUALIZED. CASE FLOW MUST BE PRESENT.

NOTE: IT IS GOOD PRACTICE TO LUBRICATE THE INTERNAL PARTS OF THESE NEW UNITS WITH HYDRAULIC FLUID BEFORE START-UP. ADD THE HYDRAULIC FLUID USED, TO THE INLET OUTLET OF THE MHT MOTORS PRIOR TO STARTING. FOR MORE COMPLETE INFORMATION ON START-UP, PLEASE CONTACT YOUR LOCAL SPERRY VICKERS REPRESENTATIVE.

FOR MULTI-TORQUE AND MULTI-SPEED OPERATION IT IS PREFERRED THAT THE "B" SINGLE PORT BODY BE USED AS INLET. IF BI-DIRECTIONAL ROTATION IS REQUIRED, USE THE "B" PORT FOR PRIMARY DIRECTION OF ROTATION. WHEN "B" PORT IS INLET THE IDLING "A" PORT MUST BE CONNECTED TO THE "B" PORT. SEE DIAGRAMS BELOW.

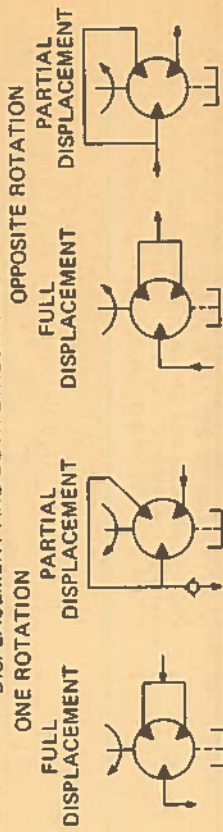


## STANDARD GRAPHICAL SYMBOLS FOR FLUID POWER DIAGRAMS



## MULTI-TORQUE MOTORS

MOTOR INSTALLATION POSSIBILITIES FOR FULL AND PARTIAL DISPLACEMENT AND BOTH DIRECTIONS OF ROTATION.



NOTE: USE OF CHECK VALVE DEPENDS ON CIRCUIT NEEDS.

CAUTION: AVOID CIRCUITS WHERE ANY CONDITIONS COULD CAUSE INTENSIFIED PRESSURE. MULTI-DISPLACEMENT MOTORS LIKE CYLINDERS, CAN EXPERIENCE INTENSIFIED PRESSURES UNDER SOME CIRCUIT CONDITIONS SUCH THAT PRESSURES WILL EXCEED THE MOTOR, PIPING OR VALVE RATING. EXAMPLE AT RIGHT:





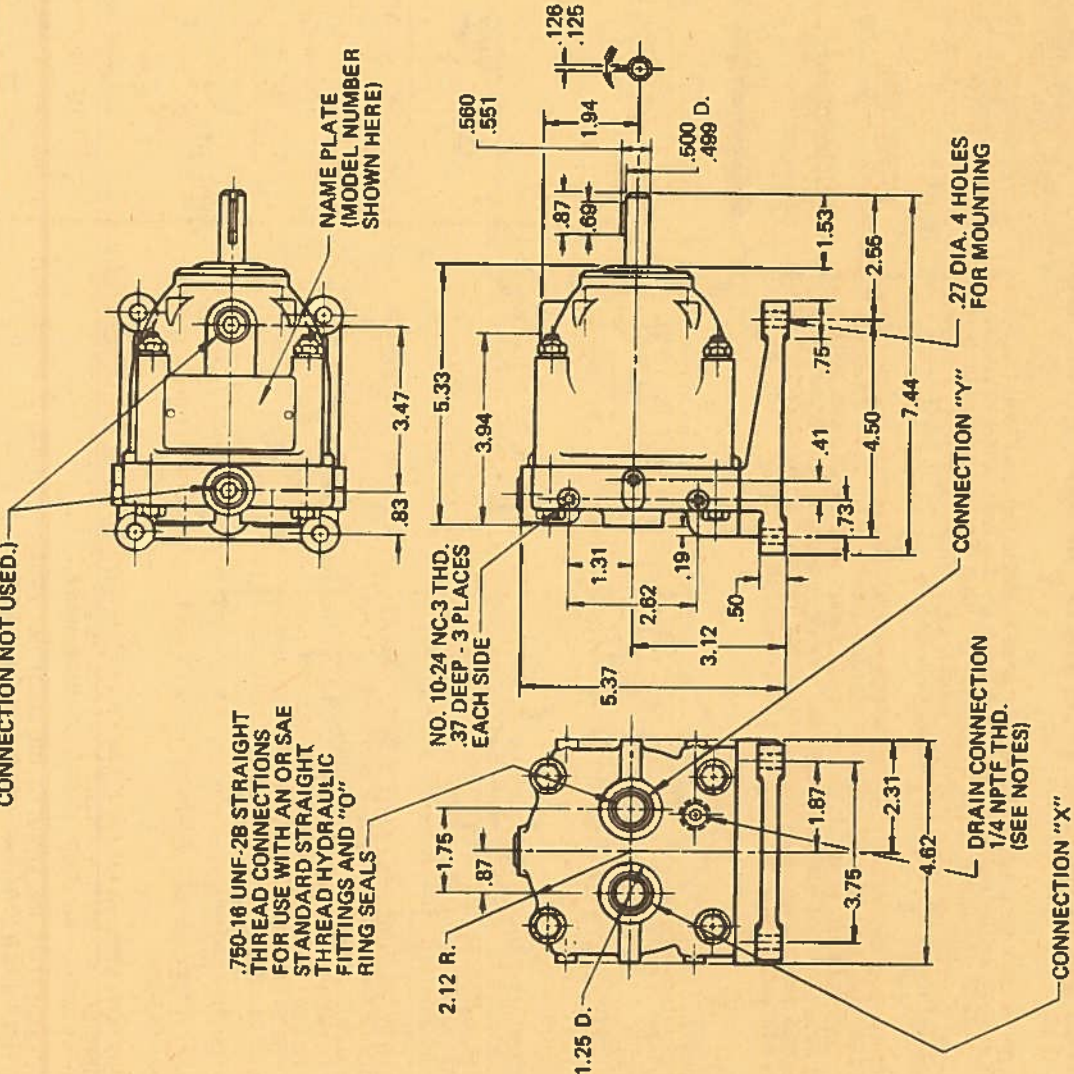


# FIXED DISPLACEMENT PISTON TYPE FLUID MOTOR

MODEL MTR3-F13-20

DRAIN CONNECTIONS

3/8 NPTF THD.  
(SEE INSTALLATION NOTE FOR  
INSTRUCTIONS IN THE USE OF  
THIS CONNECTION. PLUG  
CONNECTION NOT USED.)



GENERAL USAGE FOR CONVERSION OF HYDRAULIC POWER TO REVERSIBLE, VARIABLE SPEED, ROTARY MECHANICAL POWER. OPERATION MAY BE USED IN A CLOSED CIRCUIT SUPERCHARGED TO 30 PSI OR IN AN OPEN CIRCUIT WITH MEANS OF MAINTAINING 30 PSI BACK PRESSURE ON THE OUTLET LINE. OPERATION MAY BE CONTINUOUS, INTERMITTENT, OR STALLED WITHOUT DAMAGE TO THE MOTOR WHEN PROTECTED BY PROPER OVERLOAD RELIEF VALVE SETTING.

ROTATION AND HYDRAULIC CONNECTIONS WITH CONNECTION "X" AS THE INLET, COUNTERCLOCKWISE ROTATION OF THE MOTOR SHAFT (FACING SHAFT END) IS OBTAINED. WITH CONNECTION "Y" AS THE INLET CLOCKWISE ROTATION IS OBTAINED.

INSTALLATION HORIZONTAL MOUNTING IS RECOMMENDED TO MAINTAIN NECESSARY CASE FLUID LEVEL. THE CASE DRAIN LINE MUST BE FULL SIZE UNRESTRICTED AND CONNECTED FROM THE UPPER MOST DRAIN PORT DIRECTLY TO THE RESERVOIR IN SUCH A MANNER THAT THE HOUSING REMAINS FILLED WITH FLUID. PIPING OF DRAIN LINE MUST PREVENT SIPHONING. PIPE DRAIN LINE SO THAT IT TERMINATES BELOW RESERVOIR FLUID LEVEL. NO OTHER LINES ARE TO BE CONNECTED TO THIS DRAIN LINE. CAUTION MUST BE EXERCISED TO NEVER EXCEED 5 PSI UNIT CASE PRESSURE. SEE DRAWING 508200 (SECTION C) FOR INSTRUCTIONS ON USING THE MTR3-F13-20 WITH THE PTR3-HR-13-20.

PERFORMANCE PRESSURE (MAX. GAGE) ..... 500 PSI  
\*NOMINAL RATED SPEED ..... 1800 RPM  
TORQUE MAX. CONTINUOUS ..... 40 IN. LB.  
DISPLACEMENT (THEORETICAL) ..... 646 CU. IN./REV.  
VOLUMETRIC EFFICIENCY ..... 95%

FLUIDS USE CLEAN PETROLEUM ANTIWEAR INDUSTRIAL HYDRAULIC OIL, OR SAE 20-W AUTOMOTIVE CRANKCASE OIL DESIGNATED SC, SD OR SE. TYPE "A" AUTOMOTIVE TRANSMISSION FLUID ALSO PERMISSIBLE. DRAIN AND REFILL WITH NEW OIL EVERY 2000 HOURS OF OPERATION OR 6 MONTHS, WHICHEVER OCCURS FIRST.

WEIGHT LBS. (APPROX.) DRY ..... 10-1/4  
\*FOR HIGHER SPEEDS OR FOR SPEEDS BELOW 100 RPM, CONSULT NEAREST SALES OFFICE.

MOTOR SPEED IS DEPENDENT ON THE VOLUME OF OIL SUPPLIED TO THE MOTOR.

REVISED 3-1-74

520295

SPERRY-VICKERS  
TROY, MICHIGAN 48064

FLUID MOTOR  
FIXED DISPLACEMENT

MULTIPLE PISTON  
ROTARY TYPE

40 IN. LB.  
MAX. TORQUE

FOOT  
MOUNTING

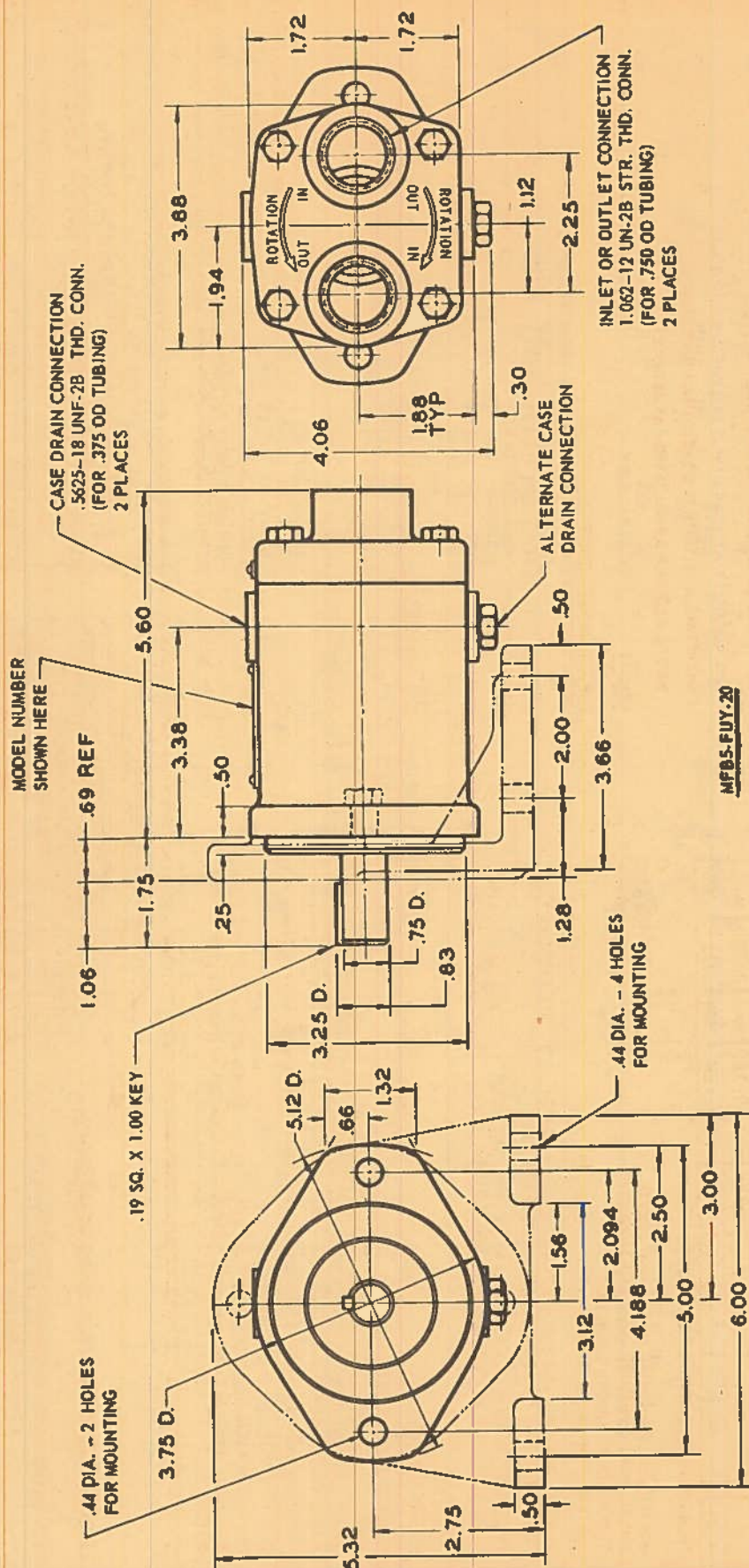
DRW. NO.  
520295



**VICKERS FIXED DISPLACEMENT, IN-LINE, PISTON MOTORS**

# MODEL SERIES MFBS

## FOOT AND FLANGE MOUNTING



## INSTALLATION

HORIZONTAL MOUNTING IS RECOMMENDED TO MAINTAIN NECESSARY CASE FLUID LEVEL. THE CASE DRAIN LINE MUST BE FULL SIZE UNRESTRICTED AND CONNECTED FROM THE UPPERMOST DRAIN PORT DIRECTLY TO THE RESERVOIR IN SUCH A MANNER THAT THE HOUSING REMAINS FILLED WITH FLUID. PIPING OF DRAIN LINE MUST PREVENT SIPHONING. PIPE DRAIN LINE SO THAT IT TERMINATES BELOW RESERVOIR FLUID LEVEL. NO OTHER LINES ARE TO BE CONNECTED TO THIS DRAIN LINE. CAUTION MUST BE EXERCISED TO NEVER EXCEED 5 PSI UNIT CASE PRESSURE.

## STARTING

BEFORE STARTING, FILL CASE WITH SYSTEM FLUID THRU UPPERMOST DRAIN PORT. HOUSING MUST BE KEPT FULL AT ALL TIMES TO PROVIDE INTERNAL LUBRICATION.

**VICKERS DIVISION  
SPERRY RAND CORPORATION  
TROY, MICHIGAN**

## IN-LINE PISTON TYPE MOTOR

**MFB5. FIXED  
DISPLACEMENT**

**3600 RPM**  
**270 LB-IN**

## FOOT & FLANGE MOUNTING

DWG NO.  
520300

REVISÉ 3-3-69 R.W.S.

520300



THESE MOTORS ARE OF THE AXIAL PISTON, FIXED DISPLACEMENT, IN LINE DESIGN RATED AT 5 G.P.M. AT 1800 R.P.M. AND 1500 PSI. THE UNIT CAN BE OPERATED IN EITHER DIRECTION OF ROTATION. FLOW DIRECTION IS AS INDICATED.

FLUID - CLEAN PETROLEUM OIL MEETING OR EXCEEDING LUBRICATING QUALITIES OF SAE 10W, MEETING API SERVICE CLASSIFICATION MS (MAXIMUM SEVERITY) IS RECOMMENDED. RECOMMEND VISCOSITY RANGE 150 TO 225 SSU AT 100°F.

MODEL	THEORETICAL DISPLACEMENT CU. IN./REV.	FLOW-GPM FOR		OPERATING SPEED RPM		PRESSURE PSI		OUTPUT TORQUE LB.-INS.	
		RATED RPM	MAX. RPM	RATED RPM	MAX. RPM	RATED	MAX.	RATED	MAX.
MF85	.643	5	10	1800	3600	1500	3000	135	270

MINIMUM RECOMMENDED OPERATING SPEED	100 RPM
BREAK AWAY PRESSURE (NO LOAD AVERAGE)	250 PSI
THEORETICAL OUTPUT TORQUE	
(L.B. INS. PER 100 PSI DIFFERENTIAL PRESSURE)	10.2

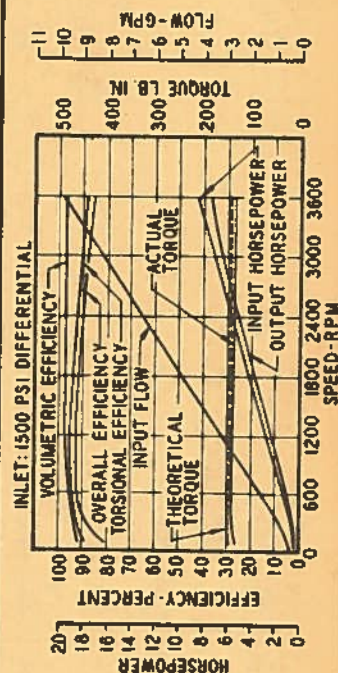
**INSTALLLED TORQUE ~ APPROXIMATELY 70% OF THE THEORETICAL OUTPUT TORQUE AT 1500 AT 1500 PSI DIFFERENTIAL PRESSURE.**

**RECOMMENDED** ..... 25 MICRON

THIS UNIT IS OF THE VARIABLE HORSEPOWER CLASS, HORSEPOWER OUTPUT BEING APPROXIMATELY PROPORTIONAL TO RPM WITH A GIVEN CONSTANT OPERATING PRESSURE. SERVICE MAY BE CONTINUOUS, INTERMITTENT, CONTINUOUS REVERSING, OR STALLED WITHOUT DAMAGE WHEN PROPERLY PROTECTED BY A RELIEF VALVE.

OUTPUT SPEEDS ARE DEPENDENT ON INPUT FLOW. SPEED RANGES OF AT LEAST 36:1 ARE POSSIBLE AT MAXIMUM TORQUE RATING BY VARYING FLOW TO THE MOTOR.

**BASED ON OIL TEMPERATURE OF 120°F -  
ATMOSPHERIC OUTLET**



THESE UNITS ARE DESIGNED TO MEET SPECIFICATIONS AS OUTLINED. TO INSURE MAXIMUM UNIT PERFORMANCE, IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION, CONSULT YOUR VICKERS APPLICATION ENGINEER IF YOUR:

**PRESSURE REQUIREMENTS ARE ABOVE RATED PRESSURE OF 1500 PSI.  
SPEED IS ABOVE 1800 RPM RATING.**

**SPEED IS BELOW MINIMUM RECOMMENDED SPEED OF 100 RPM.  
SYSTEM REQUIRES FIRE RESISTANT OR OTHER FLUID.**

**OPERATING TEMPERATURE IS NOT WITHIN 100° TO 150° F. WITH PROPER APPLICATION AND FLUID CONSIDERATION, A GREATER TEMPERATURE RANGE IS PERMISSIBLE.**

**Oil viscosity at operating conditions is not within 100 to 250 S.S.U. Application requires an indirect drive.**

**SOIL VISCOSITY AT START-UP IS IN EXCESS OF 1000 SSU.  
MOUNTING ATTITUDE IS OTHER THAN HORIZONTAL.**

**NEEDS REQUIRE APPLICATION ASSISTANCE.**

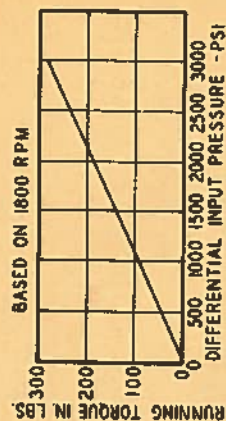
..... 11 LBS. APPROX.

```

graph TD
    Motor[MOTOR] --- MFB5["M F B 5 -"]
    Motor --- UY["U (Y) - 20"]
    Motor --- DesignNum[DESIGN NUMBER]
    
    MFB5 --- ShaftEnd[SHAFT END]
    MFB5 --- Rotation[ROTATION]
    MFB5 --- Mounting[MOUNTING]
    
    UY --- OptionalShaft["OMITTED - OPTIONAL SHAFT*  
Y - STANDARD SHAFT"]
    
    DesignNum --- NLineTypeDesign[N-LINE TYPE DESIGN]
    DesignNum --- FlangeMounting["OMITTED - FLANGE MOUNTING  
F - FOOT BRACKET MOUNTING"]

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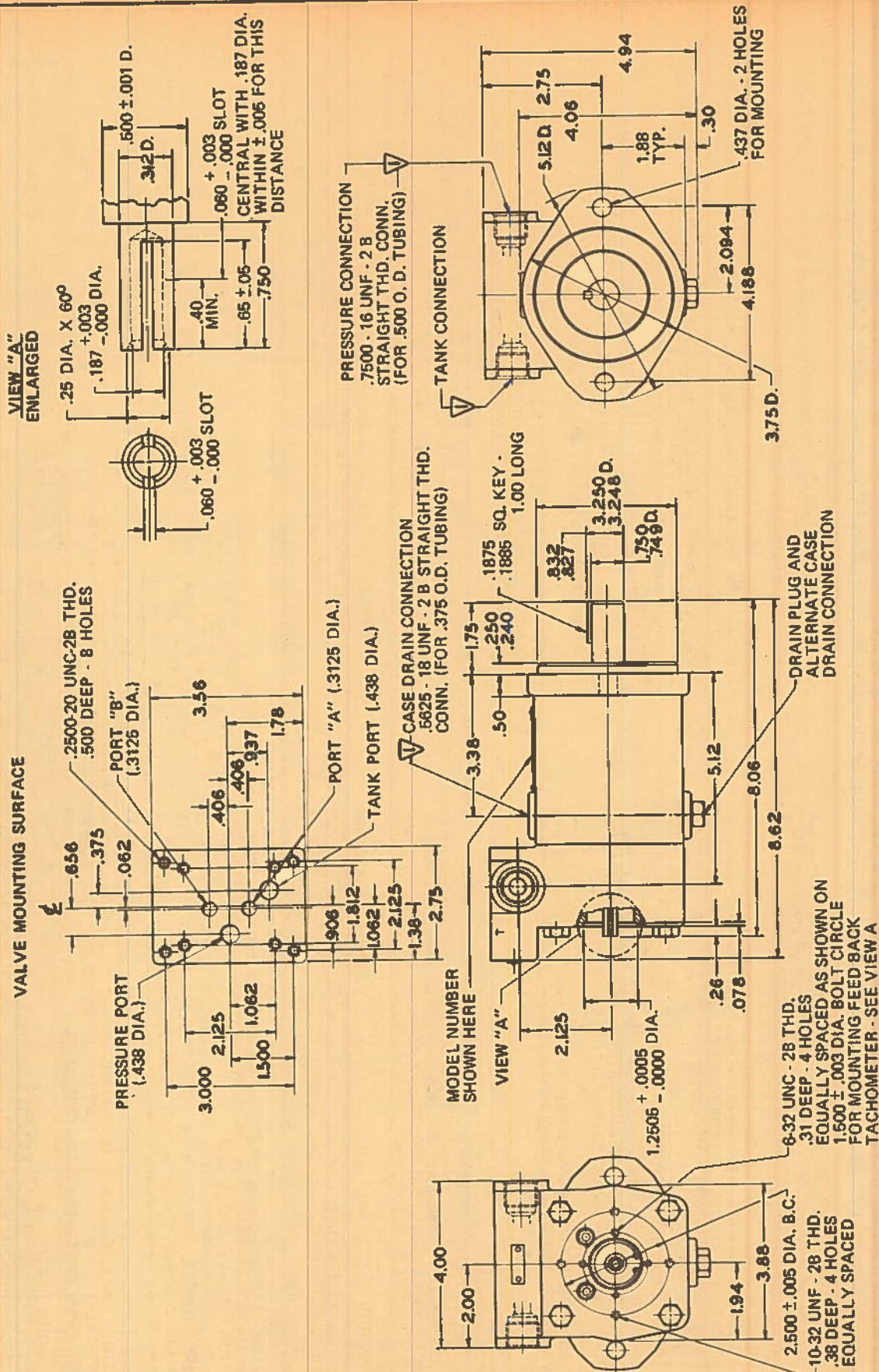
**OPTIONAL SHAFT AVAILABLE ONLY TO PROVIDE INTERCHANGEABILITY WITH EARLIER UNITS WITH -10 DESIGN NUMBERS (NOT RECOMMENDED FOR OPERATION ABOVE 1800 RPM AND 1500 PSI).**





# VICKERS®. INLINE PISTON SERVO MOTOR, FIXED DISPLACEMENT

**MODEL SERIES MFB5-U-20-S61  
FOOT OR FLANGE MOUNTING**



**DIRECTION OF ROTATION:**

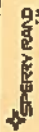
**RECTION OF ROTATION:**  
WITH PORT "A" AS INLET, ROTATION IS CLOCKWISE, LOOKING AT SHAFT END

**FOR USE WITH SAE STANDARD HYDRAULIC FITTINGS AND "O" RING SEALS**

RELEASED 2-1-70

520302





**VICKERS®**

## INLINE PISTON SERVO MOTOR, FIXED DISPLACEMENT

MODEL SERIES MFB5-U-20-SB1  
FOOT OR FLANGE MOUNTING

### GENERAL DATA

THIS MOTOR IS OF AXIAL PISTON, FIXED DISPLACEMENT INLINE DESIGN. THE MOTOR VALVE BLOCK PROVIDES A SURFACE FOR GASKET-MOUNTING VICKERS MODEL SF4 SERVO VALVE (DRAWING 501170). THUS, A COMPACT PACKAGE IS PROVIDED WITH A MINIMUM VOLUME OF OIL UNDER COMPRESSION. OTHER SERVO VALVES MAY BE USED WITH A SUITABLE ADAPTER PLATE. A THROUGH SHAFT IS PROVIDED IN THE VALVE BLOCK END TO ACCOMMODATE A FEED-BACK TACHOMETER (NOT PROVIDED).

### OPERATING CHARACTERISTICS:

THE MOTOR IS OF THE VARIABLE HORSEPOWER CLASS, HORSEPOWER OUTPUT BEING APPROXIMATELY PROPORTIONAL TO RPM WITH A GIVEN CONSTANT OPERATING PRESSURE. SERVICE MAY BE CONTINUOUS, INTERMITTENT, CONTINUOUS REVERSING, OR STALLED WITHOUT DAMAGE WITH PROPER TEMPERATURE AND RELIEF VALVE PROTECTION. OUTPUT SPEEDS ARE DEPENDENT ON INPUT FLOW.

### INSTALLATION

HORIZONTAL MOUNTING IS RECOMMENDED TO MAINTAIN NECESSARY CASE FLUID LEVEL. THE CASE DRAIN LINE MUST BE FULL SIZE UNRESTRICTED AND CONNECTED FROM THE UPPERMOST DRAIN PORT DIRECTLY TO THE RESERVOIR IN SUCH A MANNER THAT THE HOUSING REMAINS FILLED WITH FLUID. PIPING OF DRAIN LINE MUST PREVENT SIPHONING. PIPE DRAIN LINE SO THAT IT TERMINATES BELOW RESERVOIR FLUID LEVEL. NO OTHER LINES ARE TO BE CONNECTED TO THIS DRAIN LINE. CAUTION MUST BE EXERCISED TO NEVER EXCEED 5 PSI UNIT CASE PRESSURE.

### STARTING

BEFORE STARTING, FILL CASE WITH SYSTEM FLUID THRU UPPERMOST DRAIN PORT. HOUSING MUST BE KEPT FULL AT ALL TIMES TO PROVIDE INTERNAL LUBRICATION.

### SPECIFICATIONS:

FLUID — REFER TO DATA SHEET 1-286-S (SECTION L) FOR HYDRAULIC OIL RECOMMENDATIONS.

MODEL NO.	THEORETICAL DISPLACEMENT CU. IN./REV.	FLOW GPM AT 1500 PSI AND		OPERATING SPEED RPM		PRESSURE* PSI		OUTPUT TORQUE LB. - IN.	
		RATED RPM	MAX. RPM	RATED RPM	MAX. RPM	RATED	MAX.	RATED	MAX.
MFB-5	.643	5.2	10.2	1800	3600	1500	3000	135	270

\*SUM OF INLET AND OUTLET PRESSURES

OIL UNDER COMPRESSION (EACH PORT) ..... 1.12 IN.<sup>3</sup>  
THEORETICAL OUTPUT TORQUE  
(LB. - IN. PER 100 PSI DIFFERENTIAL PRESSURE) ..... 10.2

ACTUAL RUNNING TORQUE — APPROXIMATELY PROPORTIONAL TO DIFFERENTIAL PRESSURE (SEE CURVE).

STALLED TORQUE — 70% OF THE THEORETICAL OUTPUT TORQUE (APPROX. 107 LB. - IN. AT 1500 PSI DIFFERENTIAL PRESSURE).

FILTRATION  
RECOMMENDED ..... 25 MICRON  
WEIGHT LBS. (APPROX.) ..... 11  
WITH FOOT MTG ..... 15

THESE UNITS ARE DESIGNED TO MEET SPECIFICATIONS AS OUTLINED, TO INSURE MAXIMUM UNIT PERFORMANCE IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION. CONSULT YOUR VICKERS APPLICATION ENGINEER IF YOUR:

PRESSURE REQUIREMENTS ARE ABOVE RATED PRESSURE OF 1500 PSI

SPEED IS ABOVE 1800 RPM RATING

OPERATING TEMPERATURE IS NOT WITHIN 100° F. TO 150° F.

APPLICATION REQUIRES AN INDIRECT DRIVE

NEEDS REQUIRE APPLICATION ASSISTANCE

MOUNTING ATTITUDE IS OTHER THAN HORIZONTAL

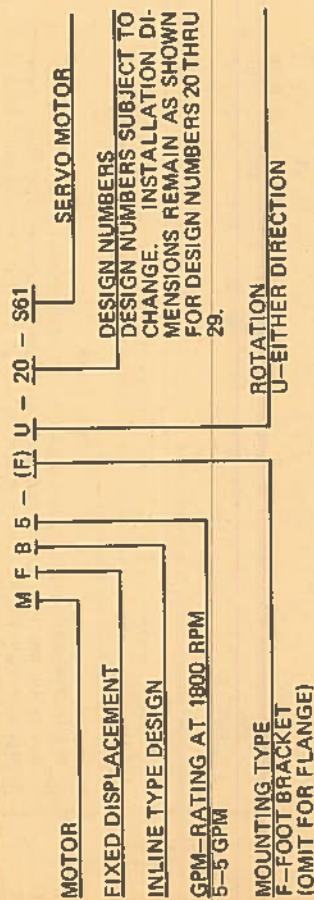
FLUID DOES NOT MEET REQUIREMENTS OF 1-286-S



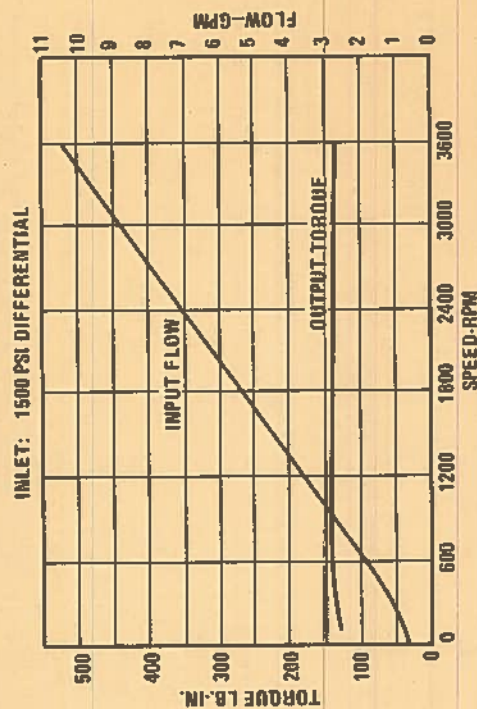
# INLINE PISTON SERVO MOTOR, FIXED DISPLACEMENT

MODEL SERIES MF85-U-20-S61  
FOOT OR FLANGE MOUNTING

## TYPICAL MODEL CODE

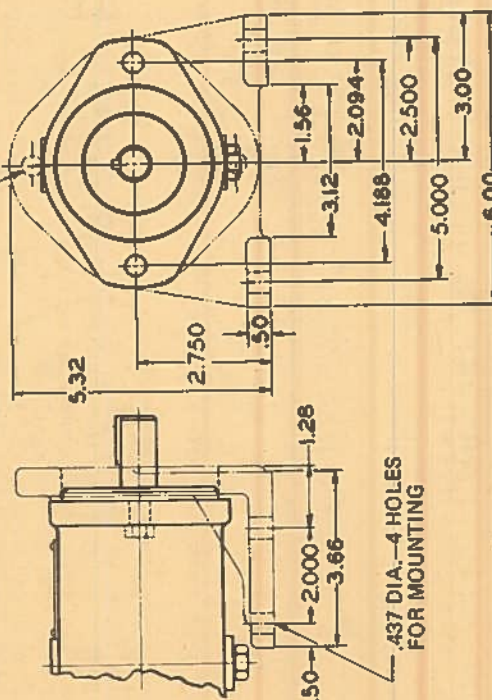


TYPICAL PERFORMANCE CHARACTERISTICS  
BASED ON OIL TEMP. OF 120° F.  
ATMOSPHERIC OUTLET

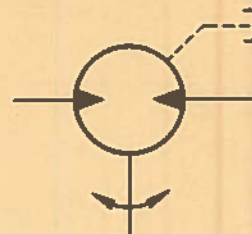


## FOOT MOUNTING

3/8 - 16 UNC-2B THD.  
4 HOLES



STANDARD GRAPHICAL SYMBOL  
FOR FLUID POWER DIAGRAMS



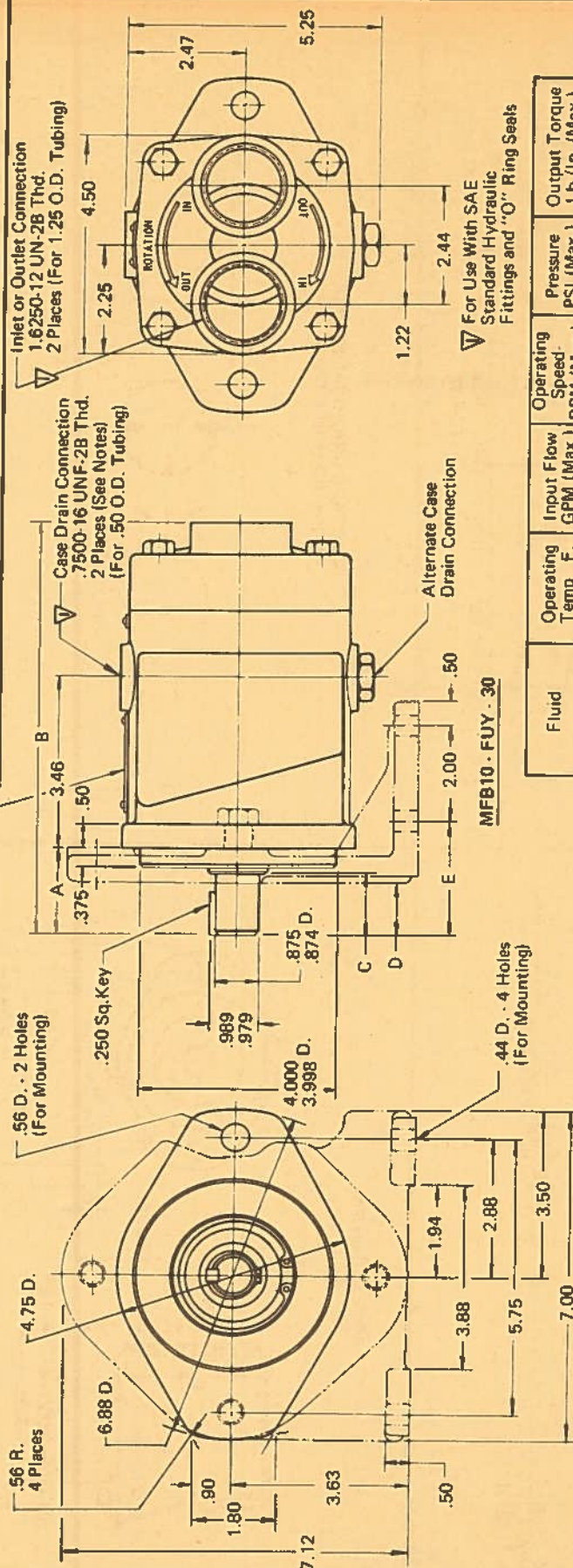


Model	A	B	C	D	E
MFB10-Y-30	2.31	8.98	1.874	—	—
MFB10-F-Y-30	2.31	8.98	1.874	1.61	2.90

SPERRY VICKERS™

FIXED DISPLACEMENT,  
IN-LINE, PISTON MOTORS

MODEL SERIES MFB10-30

Model Number  
Shown Here

For Use With SAE  
Standard Hydraulic  
Fittings and "O" Ring Seals

Fluid	Operating Temp. F.	Input Flow GPM (Max.)	Operating Speed RPM (Max.)	Pressure PSI (Max.)	Output Torque Lb./in. (Max.)
Petroleum Oil	100 - 150	18	3200	3000	568
Synthetics (Phosphate Ester) ■					
Emulsions (Water In Oil)	100 - 130	10	1800	2500	480
Water Glycol					

■ Sum of inlet and outlet pressures.

■ Add prefix "F3" to model number.

A reduction of predicted life from that of petroleum oil should be expected when using fire-resistant fluids. The following percentages of life reduction as compared with petroleum, may be used.

Fluid Type	Reduction of Life
Synthetics (Phosphate Ester)	0 - 25%
Emulsions (Water In Oil)	20 - 30%
Water Glycol Fluids	40 - 60%

■ Refer to fluid and temperature data sheet 1-286 S.

## Installation

Horizontal mounting is recommended to maintain necessary case fluid level. The case drain line must be full size unrestricted and connected from the uppermost drain port directly to the reservoir in such a manner that the housing remains filled with fluid. Piping of drain line must prevent siphoning. Pipe drain line so that it terminates below reservoir fluid level. No other lines are to be connected to this drain line. Caution must be exercised to never exceed 10 PSI unit case pressure.

## Starting

Before starting, fill case with system fluid thru uppermost drain port. Housing must be kept full at all times to provide internal lubrication.

SPERRY VICKERS  
TROY, MICHIGAN 48084PISTON MOTOR  
IN-LINE TYPEMFB10 FIXED  
DISPLACEMENT3200 RPM  
568 LB. IN.FOOT AND  
FLANGE  
MOUNTINGDWG. NO.  
520305

REVISED 12-1-78

520305



# General Data

This motor is of the axial piston, fixed displacement, in-line design. Theoretical displacement is 1.29 cu. in./rev.

## Operating Characteristics

Unit is of the variable horsepower class. Horsepower output being approximately proportional to RPM with a given constant operating pressure. Service may be continuous, intermittent, continuous reversing, or stalled without damage when properly protected by relief valve.

Recommended minimum smooth running..... 100 RPM

Break-away pressure nom. (no load)..... 320 PSI

## Drive Rotation

Motors will operate in either a clockwise or counterclockwise direction by reversing direction of fluid flow.

## Filtration

Recommended..... 35 Micron Absolute or Finer

## Weight Approx. (Dry)

Flange Mounting..... 21 Lbs.

Foot Mounting..... 26 Lbs.

This unit is designed to meet specifications as outlined. To insure maximum inlet unit performance, in conjunction with your specific application, consult your local Sperry Vickers Representative if you:

Speed is below minimum recommended speed of 100 RPM. Minimum speed varies with conditions. Depending on application and circuit consideration, lower motor speeds are obtainable maintaining  $\pm 10\%$  speed variation.

Oil viscosity at operating conditions is not within 100 to 250 SSU.

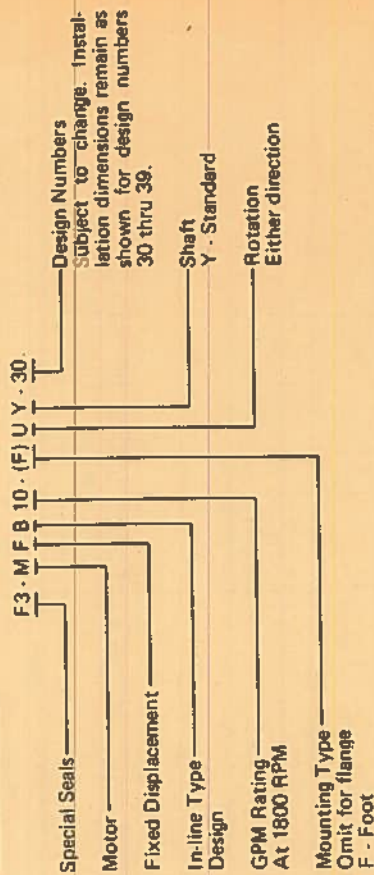
Oil viscosity at start-up is in excess of 1000 SSU.

Application involves rapid shaft reversals.

Mounting attitude is other than horizontal.

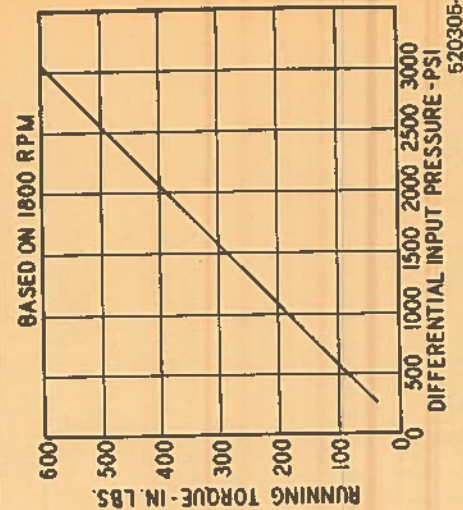
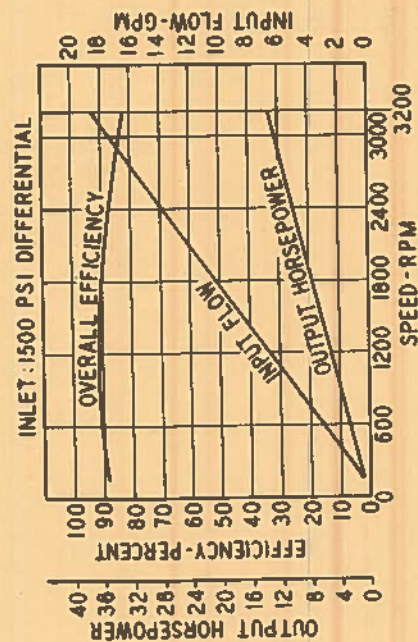
Needs require application assistance.

## Typical Model Code



## PERFORMANCE CHARACTERISTICS

BASED ON OIL TEMPERATURE OF 120 F. (100 SSU)  
AND AT ATMOSPHERE OUTLET





# **SPERRY VICKERS** T.M. **FIXED DISPLACEMENT, IN-LINE, PISTON MOTORS**

MODEL SERIES MFB20 AND MFB29 - .10 DESIGN  
FLANGE OR FOOT MOUNTING

**SPERRY VICKERS**  
TROY, MICHIGAN 48064

IN-LINE PISTON  
TYPE MOTOR

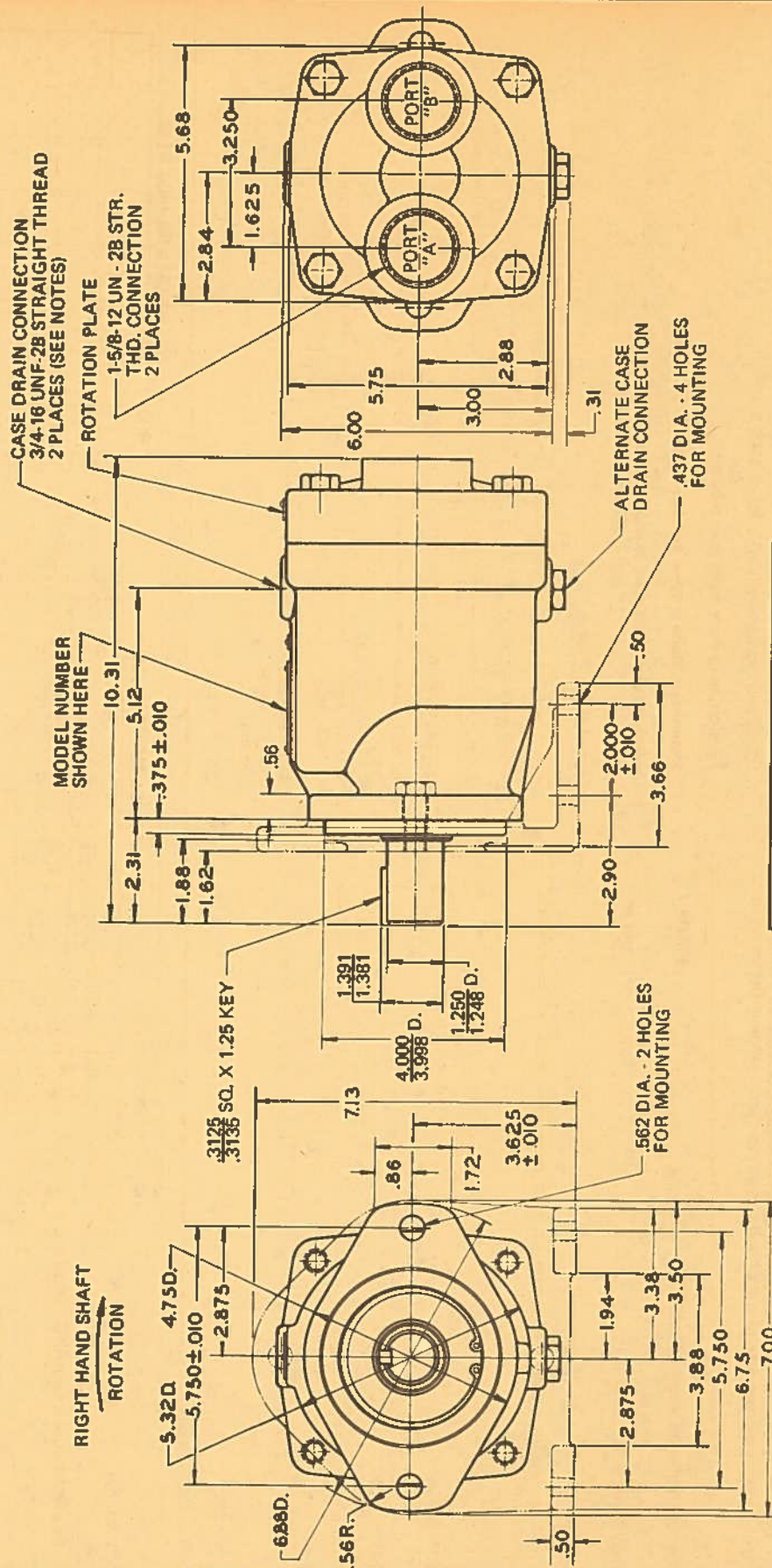
MFB20  
AND MFB29  
FIXED DISPLACEMENT

MFB20  
2400 RPM  
900 LB-IN

MFB29  
2400 RPM  
1040 LB-IN

FOOT OR FLANGE  
MOUNTING

DWG. NO.  
520310





# FIXED DISPLACEMENT, IN-LINE, PISTON MOTORS

MODEL SERIES MFB20 AND MFB29 10 DESIGN  
FLANGE OR FOOT MOUNTING

## GENERAL DATA

THESE MOTORS ARE OF THE AXIAL PISTON, CONSTANT DISPLACEMENT INLINE DESIGN. THEY CAN BE OPERATED IN EITHER DIRECTION OF ROTATION.

## OPERATING CHARACTERISTICS:

THE MOTORS ARE OF THE VARIABLE HORSEPOWER CLASS, HORSEPOWER OUTPUT BEING APPROXIMATELY PROPORTIONAL TO RPM WITH A GIVEN CONSTANT OPERATING PRESSURE. SERVICE MAY BE CONTINUOUS, INTERMITTENT, CONTINUOUS REVERSING, OR STALLED WITHOUT DAMAGE WHEN PROPERLY PROTECTED BY A RELIEF VALVE AND COOLING.

OUTPUT SPEEDS ARE DEPENDENT ON INPUT FLOW. SPEED RANGES OF AT LEAST 48:1 FOR THE MFB20 AND 30:1 FOR THE MFB29 ARE POSSIBLE AT MAXIMUM TORQUE RATING BY VARYING FLOW TO THE MOTOR.

## INSTALLATION

HORIZONTAL MOUNTING IS RECOMMENDED TO MAINTAIN NECESSARY CASE FLUID LEVEL. THE CASE DRAIN LINE MUST BE FULL SIZE UNRESTRICTED AND CONNECTED FROM THE UPPERMOST DRAIN PORT DIRECTLY TO THE RESERVOIR IN SUCH A MANNER THAT THE HOUSING REMAINS FILLED WITH FLUID. PIPING OF DRAIN LINE MUST PREVENT SIPHONING. PIPE DRAIN LINE SO THAT IT TERMINATES BELOW RESERVOIR FLUID LEVEL. NO OTHER LINES ARE TO BE CONNECTED TO THIS DRAIN LINE. CAUTION MUST BE EXERCISED TO NEVER EXCEED 5 PSI UNIT CASE PRESSURE.

## STARTING

BEFORE STARTING, FILL CASE WITH SYSTEM FLUID THRU UPPERMOST DRAIN PORT. HOUSING MUST BE KEPT FULL AT ALL TIMES TO PROVIDE INTERNAL LUBRICATION.

## SPECIFICATIONS

REFER TO DATA SHEET I-286-S FOR HYDRAULIC FLUID AND TEMPERATURE RECOMMENDATIONS.

MODEL NO.	THEORETICAL DISPLACEMENT CU. IN./REV.	OPERATING SPEED RPM MAX.	PRESSURE* PSI MAX.
MFB-20	2.61	2400	2500
MFB-29	3.76	2400	2000

\*SUM OF INLET AND OUTLET PRESSURES

MINIMUM RECOMMENDED OPERATING SPEED (RPM). . . . . MFB20. . . . . 50  
MFB29. . . . . 80  
BREAK AWAY PRESSURE PSI (NO LOAD AVERAGE). . . . . 350

THEORETICAL OUTPUT TORQUE (LB. INS. PER 100 PSI DIFFERENTIAL PRESSURE). . . . . MFB-20. . . . . 41.5  
MFB-29. . . . . 59.8

FILTRATION RECOMMENDED. . . . . 25 MICRON  
WEIGHT LBS. (APPROX.) . . . . . 41  
FLANGE MTG. . . . . 46  
FOOT MTG. . . . . 46

THESE UNITS ARE DESIGNED TO MEET SPECIFICATIONS AS OUTLINED. TO INSURE MAXIMUM UNIT PERFORMANCE, IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION, CONSULT YOUR SPERRY VICKERS APPLICATION ENGINEER IF YOUR:

SPEED IS ABOVE 1800 RPM

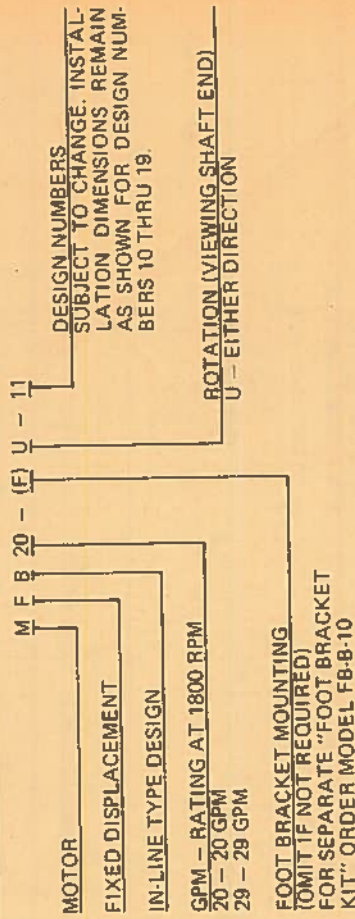
FLUID DOES NOT MEET THE SPECIFICATIONS SHOWN ON DATA SHEET I-286-S

APPLICATION REQUIRES AN INDIRECT DRIVE

MOUNTING ATTITUDE IS OTHER THAN HORIZONTAL

NEEDS REQUIRE APPLICATION ASSISTANCE

## TYPICAL MODEL CODE



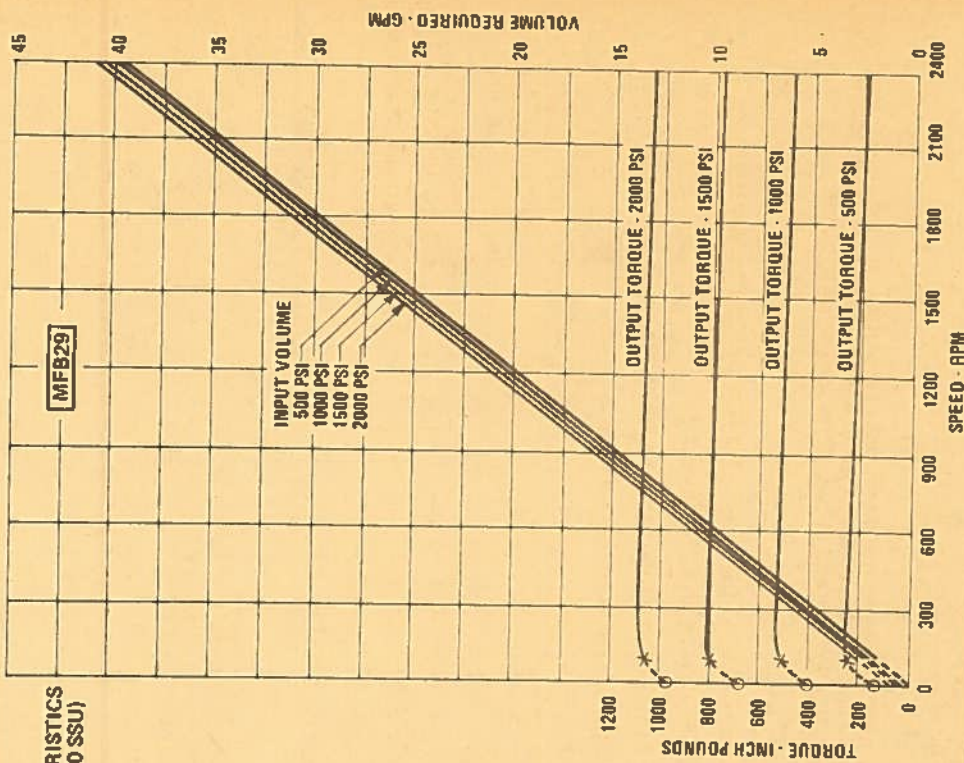
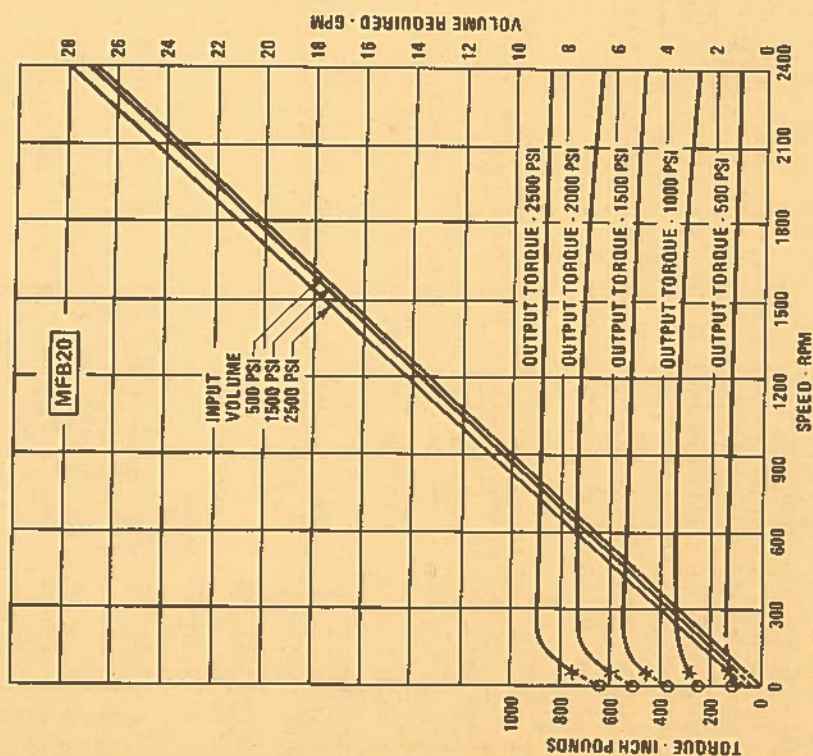


# FIXED DISPLACEMENT, IN-LINE, PISTON MOTORS

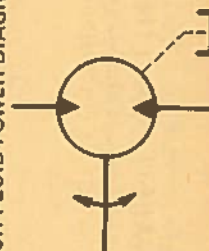
MODEL SERIES MFB20 AND MFB29 - .10 DESIGN  
FLANGE OR FOOT MOUNTING

TYPICAL PERFORMANCE CHARACTERISTICS  
BASED ON OIL TEMP. OF 120° F. (100 SSU)

- X INDICATES MINIMUM  
SPEED WITH APPROX-  
IMATELY ± 10% SPEED  
VARIATION
- O INDICATES STALL  
TORQUE
- INDICATES ESTIMATED  
VALUES

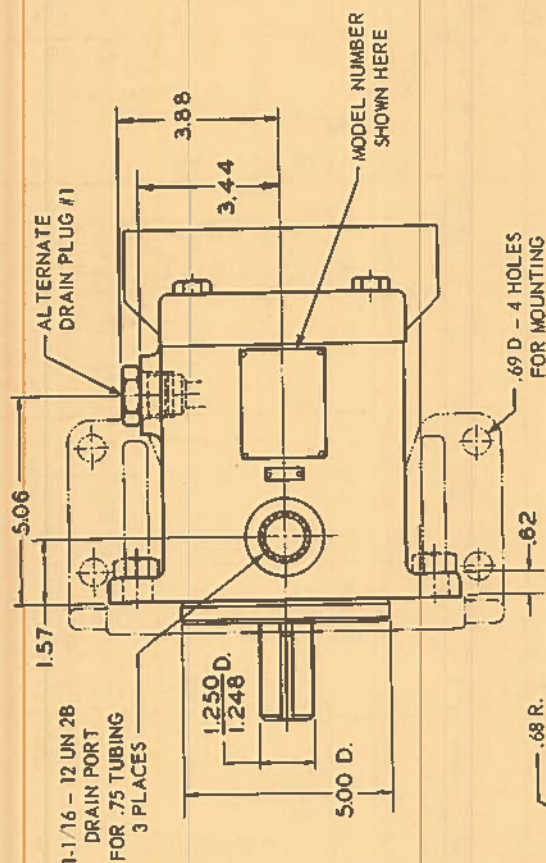


STANDARD GRAPHICAL SYMBOL  
FOR FLUID POWER DIAGRAMS



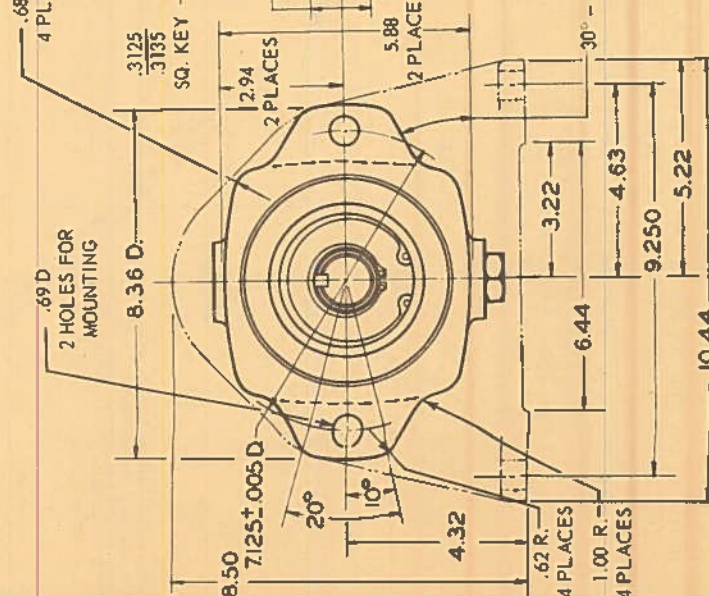
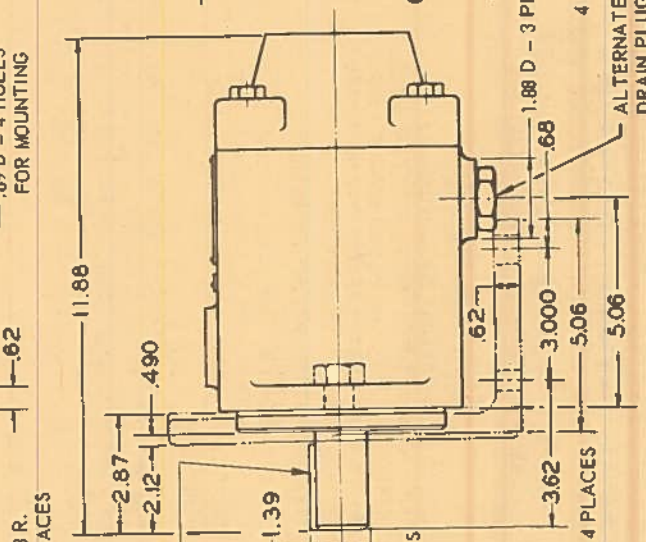
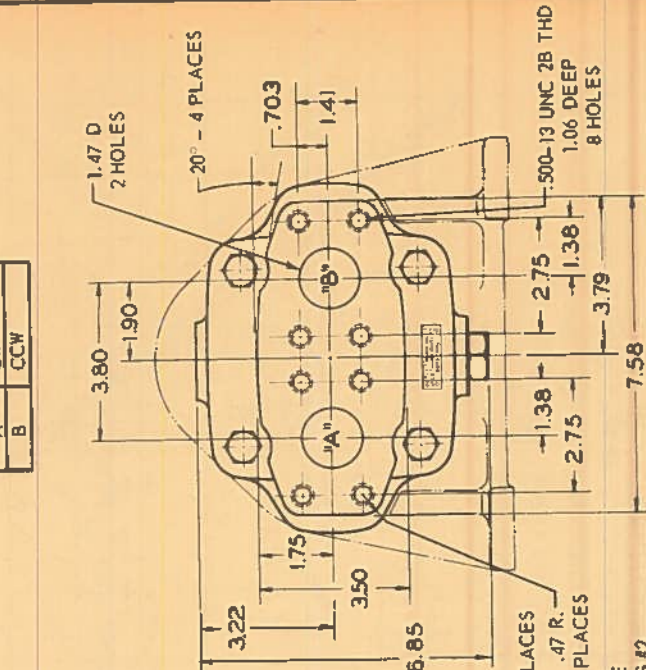


# **VICKERS FIXED DISPLACEMENT PISTON MOTOR** **MODEL SERIES MFB29-20 DESIGN (IN-LINE TYPE)** **FLANGE AND FOOT MOUNTING**



ROTATION - VIEWED FROM SHAFT END

INLET	ROTATION
A	CW
B	CCW



VICKERS DIVISION  
 SPERRY RAND CORPORATION  
 TROY, MICHIGAN

PISTON MOTOR  
 IN-LINE TYPE

FIXED  
 DISPLACEMENT

2400 RPM  
 1580 LB. IN

FLANGE OR FOOT  
 BRACKET MOUNTED

DWG NO.  
 520315



## GENERAL DATA

THIS MOTOR IS OF THE AXIAL PISTON, FIXED DIS-  
PLACEMENT, IN-LINE DESIGN. IT IS RATED AT 29 GPM  
1800 RPM AND 1500 PSI.

## OPERATING CHARACTERISTICS

UNIT IS OF THE VARIABLE HORSEPOWER CLASS.  
HORSEPOWER OUTPUT BEING APPROXIMATELY PRO-  
PORTIONAL TO RPM WITH A GIVEN CONSTANT OPERA-  
TING PRESSURE. SERVICE MAY BE CONTINUOUS,  
INTERMITTENT, CONTINUOUS REVERSING, OR STAL-  
LED WITHOUT DAMAGE WHEN PROPERLY PROTECTED  
BY RELIEF VALVE.

## OPERATING SPECIFICATIONS

THEORETICAL DISPLACEMENT. . . 3.76 CU. IN./REV.

## FLOW REQUIREMENT (NO LOAD)

AT RATED SPEED . . . . . 29 GPM  
AT MAXIMUM SPEED . . . . . 39 GPM

## OPERATING SPEED

RATED . . . . . 1800 RPM  
MAXIMUM . . . . . 2400 RPM  
MINIMUM SMOOTH RUNNING . . . . . 50 RPM

## OPERATING PRESSURE

RATED (ATMOSPHERIC OUTLET) . . . . . 1500 PSI  
MAXIMUM RECOMMENDED SUM OF  
INLET AND OUTLET PRESSURES . . . . . 3000 PSI

## OUTPUT TORQUE

RATED . . . . . 775 LB. IN.  
MAXIMUM . . . . . 1580 LB. IN.

## CASE PRESSURE

NOT TO EXCEED . . . . . 5 PSI

## DRIVE ROTATION

MOTORS WILL OPERATE IN EITHER A CLOCKWISE  
OR COUNTERCLOCKWISE DIRECTION BY REVERS-  
ING DIRECTIONS OF FLUID FLOW.

## INSTALLATION

THE ATTITUDE OF THE UNIT IS NOT LIMITED. A  
FULL SIZE UNRESTRICTED CASE DRAIN LINE  
MUST BE CONNECTED FROM THE UPPERMOST  
DRAIN PORT DIRECTLY TO THE RESERVOIR IN  
SUCH A MANNER THAT THE HOUSING REMAINS  
FILLED WITH FLUID. PIPING OF DRAIN LINE MUST  
PREVENT SIPHONING. DRAIN LINE MUST TERMI-  
NATE BELOW RESERVOIR FLUID LEVEL.

## FILTRATION

PRESSURE OR RETURN LINE . . . . . 25 MICRON

## STARTING

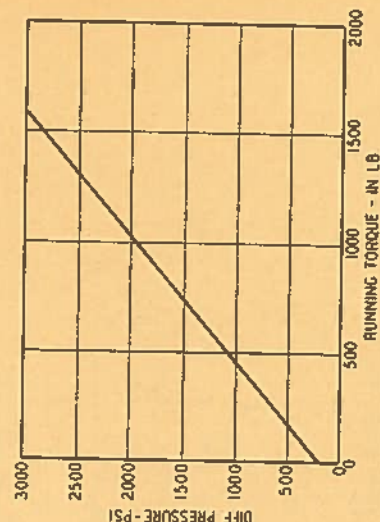
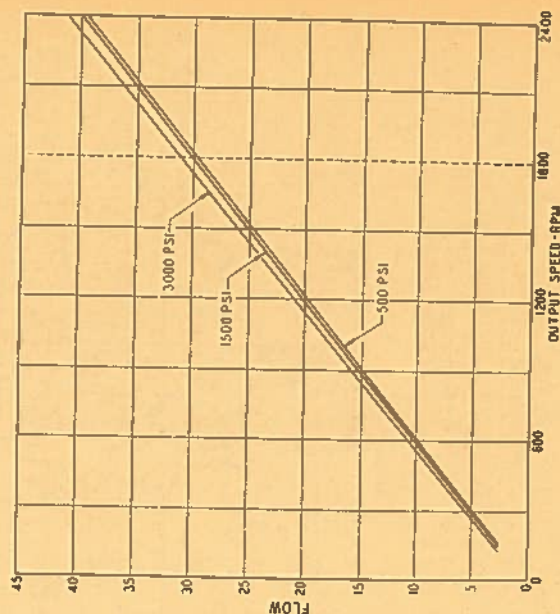
BEFORE STARTING, FILL THE CASE WITH SYSTEM  
FLUID THRU THE UPPERMOST DRAIN PORT. THE  
HOUSING MUST BE KEPT FULL AT ALL TIMES TO  
PROVIDE INTERNAL LUBRICATION.

SPERRY RAND

# VICKERS FIXED DISPLACEMENT PISTON MOTOR

MODEL SERIES MFB29-20 DESIGN (IN-LINE TYPE)

## PERFORMANCE CHARACTERISTICS BASED ON OIL TEMPERATURE OF 120° F. (100 SSU) AND ATMOSPHERIC OUTLET



NOTE: INITIAL PRESSURE REQUIRED FOR STARTING A LOAD  
IS ABOUT 30% HIGHER THAN VALUES SHOWN

THIS UNIT IS DESIGNED TO MEET SPECIFICATIONS AS  
OUTLINED. TO INSURE MAXIMUM UNIT PERFORMANCE, IN  
CONJUNCTION WITH YOUR SPECIFIC APPLICATION, CON-  
SULT YOUR VICKERS APPLICATION ENGINEER IF YOUR:  
PRESSURE REQUIREMENTS ARE ABOVE RATED PRES-  
SURE OF 1500 PSI.  
SPEED IS ABOVE 1800 RPM RATING.

SPEED IS BELOW MINIMUM RECOMMENDED SPEED OF  
50 RPM. MINIMUM SPEED VARIES WITH CONDITIONS.  
DEPENDING ON APPLICATION AND CIRCUIT CONSID-  
ERATION, LOWER MOTOR SPEEDS ARE OBTAINABLE  
MAINTAINING  $\pm 10\%$  SPEED VARIATION.

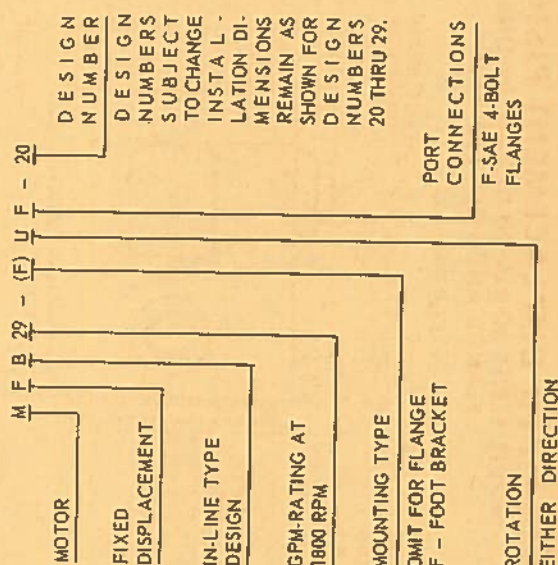
SYSTEM REQUIRES FIRE RESISTANT FLUID.  
OPERATING TEMPERATURE IS NOT WITHIN 100° TO  
150° F. WITH PROPER APPLICATION AND FLUID CON-  
SIDERATION, A GREATER TEMPERATURE RANGE IS  
PERMISSIBLE.

OIL VISCOSITY AT OPERATING CONDITIONS IS NOT  
WITHIN 100 TO 250 SSU.

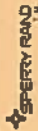
APPLICATION REQUIRES AN INDIRECT DRIVE.  
OIL VISCOSITY AT START-UP IS IN EXCESS OF 1000  
SSU.

NEEDS REQUIRE APPLICATION ASSISTANCE.

## TYPICAL MODEL CODE







# **VICKERS® FIXED DISPLACEMENT IN-LINE, PISTON MOTORS** MODEL SERIES MFB45-UF-10 FLANGE OR FOOT MOUNTING

VICKERS DIVISION  
 OF SPERRY RAND CORPORATION  
 TROY, MICHIGAN 48064

PISTON MOTOR  
 INLINE TYPE

FIXED  
 DISPLACEMENT

2200 RPM  
 2400 LB. IN.

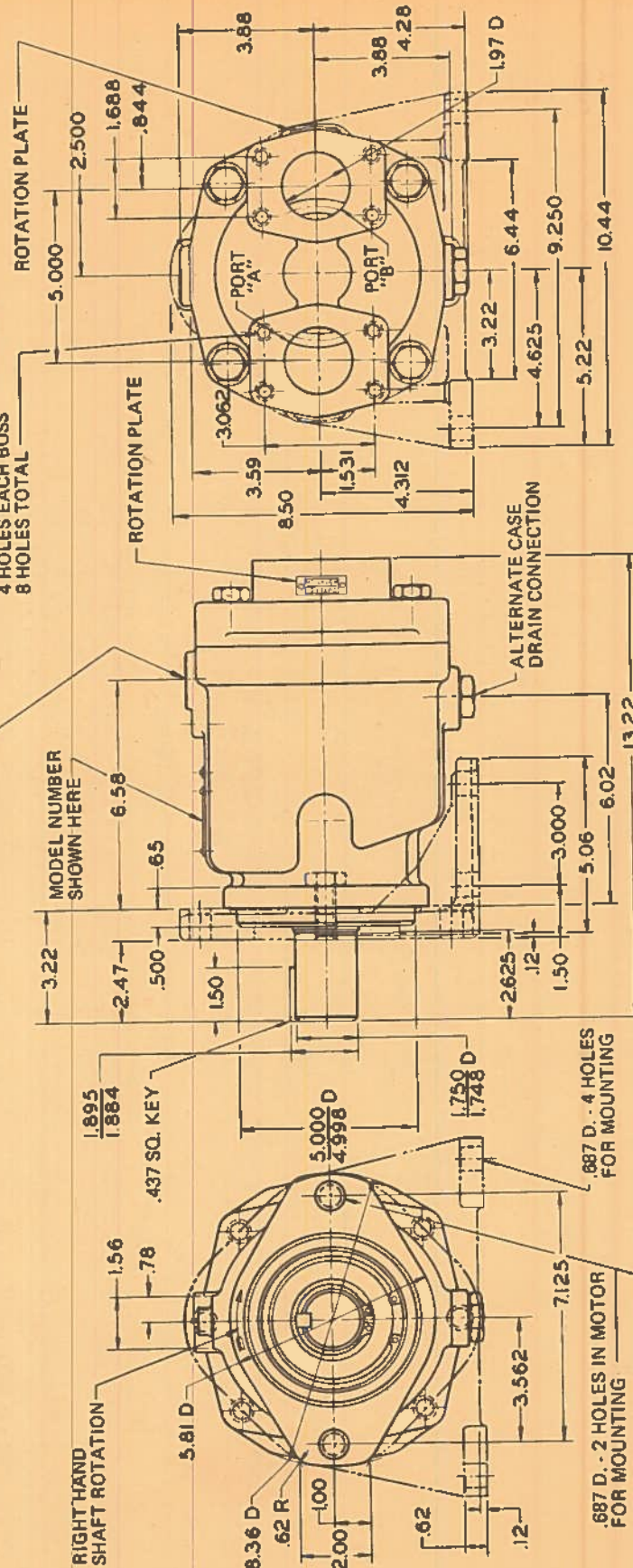
FLANGE OR  
 FOOT BRACKET  
 MOUNTING

DWG. NO.  
 520325

MODEL NUMBER	SHAFT ROTATION	OUTLET PORT
MFB45-UF-10	R.H.	"A"
MFB45-UF-10	L.H.	"B"

CASE DRAIN CONNECTION  
 1.0625-12 UN - 28 THD.  
 SAE "O" RING BOSS CONNECTION  
 FOR 3/4 O.D. TUBING  
 2 PLACES

.500-13 UNC - 28 THD. - 1.06 DEEP  
 4 HOLES EACH BOSS  
 8 HOLES TOTAL





## GENERAL DATA

THESE MOTORS ARE OF THE AXIAL PISTON, FIXED DISPLACEMENT INLINE DESIGN. THEY CAN BE OPERATED IN EITHER DIRECTION OF ROTATION.

## OPERATING CHARACTERISTICS:

THE MOTORS ARE OF THE VARIABLE HORSEPOWER CLASS, HORSEPOWER OUTPUT BEING APPROXIMATELY PROPORTIONAL TO RPM WITH A GIVEN CONSTANT OPERATING PRESSURE. SERVICE MAY BE CONTINUOUS, INTERMITTENT, CONTINUOUS REVERSING OR STALLED WITHOUT DAMAGE WHEN PROPERLY PROTECTED BY A RELIEF VALVE AND COOLING.

## INSTALLATION

HORIZONTAL MOUNTING IS RECOMMENDED TO MAINTAIN NECESSARY CASE FLUID LEVEL. THE CASE DRAIN LINE MUST BE FULL SIZE UNRESTRICTED AND CONNECTED FROM THE UPPERMOST DRAIN PORT DIRECTLY TO THE RESERVOIR IN SUCH A MANNER THAT THE HOUSING REMAINS FILLED WITH FLUID. PIPING OF DRAIN LINE MUST PREVENT SIPHONING. PIPE DRAIN LINE SO THAT IT TERMINATES BELOW RESERVOIR FLUID LEVEL. NO OTHER LINES ARE TO BE CONNECTED TO THIS DRAIN LINE. CAUTION MUST BE EXERCISED TO NEVER EXCEED 5 PSI UNIT CASE PRESSURE.

## FILTRATION

RECOMMENDED (PRESSURE OR RETURN LINE)..... 25 MICRON

## FLUIDS

REFER TO DATA SHEET I-286-S (SECTION L) FOR HYDRAULIC OIL RECOMMENDATIONS.

## STARTING

BEFORE STARTING, FILL CASE WITH SYSTEM FLUID THRU UPPERMOST DRAIN PORT. HOUSING MUST BE KEPT FULL AT ALL TIMES TO PROVIDE INTERNAL LUBRICATION.

## SPECIFICATIONS

THEORETICAL DISPLACEMENT CU. IN./REV. .... 5.76  
 OPERATING SPEED RPM. .... { MAXIMUM 2200  
 MINIMUM 100  
 PRESSURE PSI. .... MAXIMUM (SUM OF INLET AND OUTLET) 3000  
 BREAK AWAY PRESSURE PSI (NO LOAD)..... 165  
 FLOW REQUIREMENT GPM (NO LOAD) @ RATED SPEED..... 45  
 THEORETICAL OUTPUT TORQUE (LB. IN./100 PSI DIFFERENTIAL PRESSURE)..... 92  
 ACTUAL RUNNING TORQUE - APPROXIMATELY 85% OF THE THEORETICAL OUTPUT TORQUE AT 1500 PSI DIFFERENTIAL PRESSURE.  
 STALLED TORQUE - APPROXIMATELY 80% OF THE THEORETICAL OUTPUT TORQUE AT 1500 PSI DIFFERENTIAL PRESSURE.

WEIGHT LBS. (APPROX.)

FLANGE MOUNTING..... 73

FOOT MOUNTING..... 87

THESE UNITS ARE DESIGNED TO MEET SPECIFICATIONS AS OUTLINED. TO INSURE MAXIMUM UNIT PERFORMANCE, IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION, CONSULT YOUR VICKERS APPLICATION ENGINEER IF YOUR:

- FLUID DOES NOT MEET THE SPECIFICATIONS SHOWN ON DATA SHEET I-286-S
- APPLICATION REQUIRES AN INDIRECT DRIVE
- MOUNTING ATTITUDE IS OTHER THAN HORIZONTAL
- NEEDS REQUIRE APPLICATION ASSISTANCE

## MODEL CODE

MFB 45 - (F) UF - 10

## MOTOR

## FIXED DISPLACEMENT

## INLINE TYPE DESIGN

GPM - RATING AT 1800 RPM

FOOT BRACKET MOUNTING

(OMIT WHEN NOT INCLUDED)

## DESIGN NUMBER

SUBJECT TO CHANGE. INSTALLATION DIMENSIONS REMAIN AS SHOWN FOR DESIGN NUMBERS 10 THRU 19.

SAE 4-BOLT FLANGE PORTS

ROTATION (VIEWING SHAFT END)

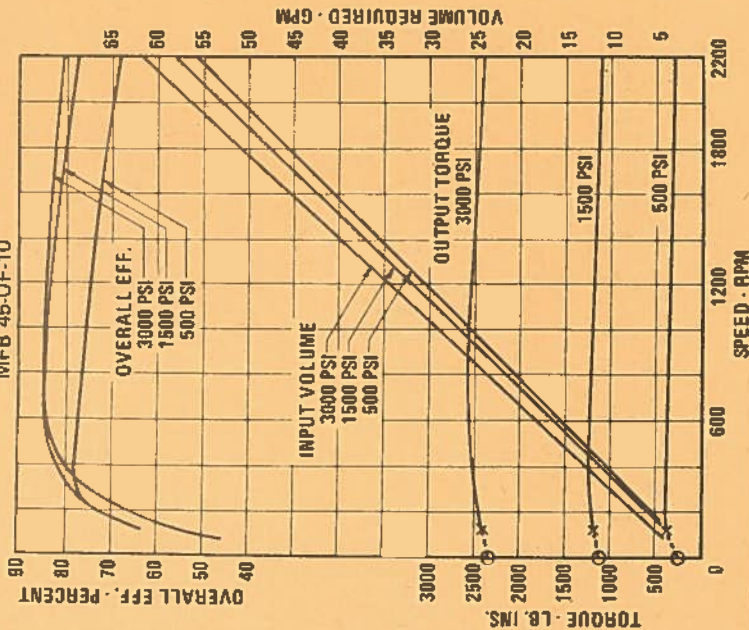
U - EITHER DIRECTION

## PERFORMANCE CHARACTERISTICS

BASED ON OIL TEMP. OF 120° F. (100 SSU)

X INDICATES MINIMUM SPEED WITH APPROXIMATELY ±10% SPEED VARIATION  
 O INDICATES STALL TORQUE --- INDICATES ESTIMATED VALUE.

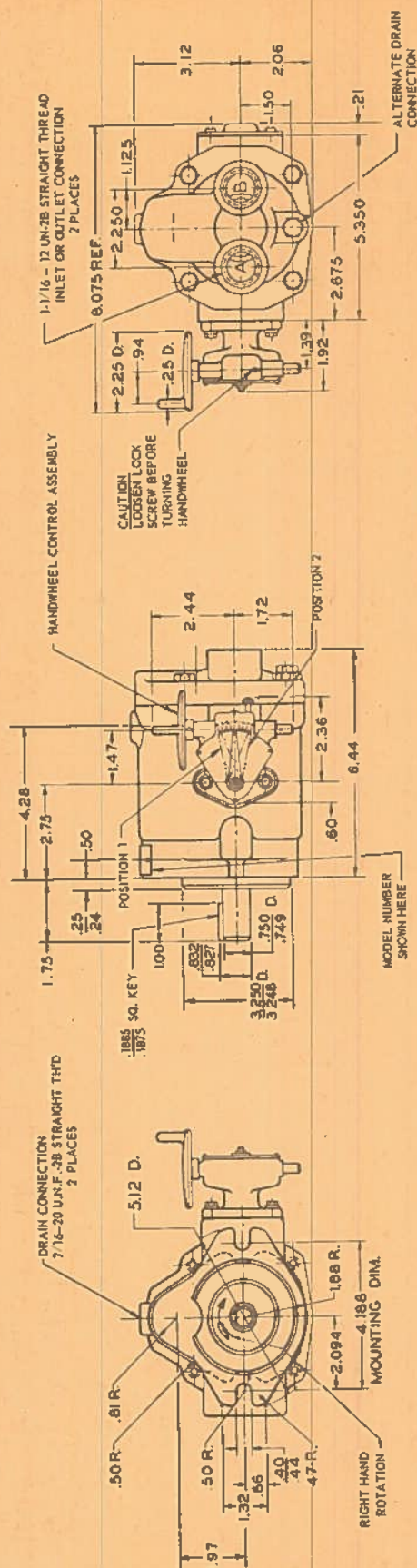
MFB 45-UF-10



STANDARD GRAPHICAL SYMBOL  
FOR FLUID POWER DIAGRAMS



PISTON MOTOR IN-LINE TYPE	MVB5 VARIABLE DISPLACEMENT	3600 RPM 270 LB. IN. TORQUE	HANDWHEEL & LEVER CONTROLS	FLANGE & FOOT MOUNTING	INST. DRWG. I-273831
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## STEERING CONTROL

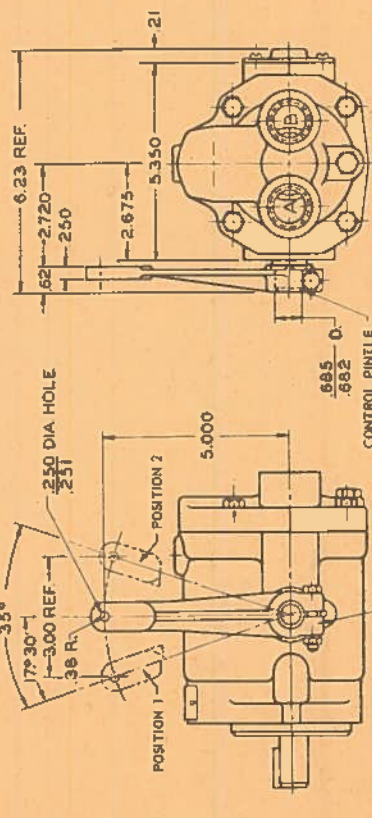
PROVIDES MANUAL SELECTION OF MOTOR DISPLACEMENT. HANDWHEEL CONTROLLED UNITS MAY BE OPERATED ON EITHER SIDE OF CENTER PERMITTING BI-DIRECTIONAL OUTPUT ROTATION.

SHAFT ROTATION	POINTER POSITION	HANDWHEEL ROTATION FROM ZERO	INLET PORT
R.H.	1	CLOCKWISE	B
R.H.	2	COUNTER CLOCKWISE	A
L.H.	1	CLOCKWISE	A
L.H.	2	COUNTER CLOCKWISE	B

## LEVER CONTROL

PROVIDES MECHANICAL, OR MANUAL, SELECTION OF JOINT POSITION. LEVER OR CONTROL ROD MAY BE OPERATED ON EITHER SIDE OF CENTER, PERMITTING BIPOLAR OR UNIPOLAR OUTPUT CHARACTERISTICS. LEVER OR CONTROL ROD MUST BE SECURED BY SUITABLE LOCK, IN ORDER TO MAINTAIN DESIRED SETTING. THE CENTER PINTLE MAY BE ROTATED 12-1/2° ON EACH SIDE OF CENTER POSITION TO PERMIT FULL REVERSAL OF OUTPUT SIGNAL. PINTLE TRAVEL IS LIMITED TO 35° FOR UNIPOLAR STOPS. TORQUE REQUIRED TO ROTATE CENTER PINTLE IS APPROXIMATELY 40 IN. LBS. AT RATED SPEED AND PRESSURE.

SHAFT ROTATION	LEVER POSITION	INLET PORT
R.H.	1	B
R.H.	2	A
L.H.	1	A
L.H.	2	B



**CAUTION**

EXCESSIVE OUTPUT SPEED WILL OCCUR IF HAND-  
WHEEL OR LEVER CONTROLS ARE USED TO  
POSITION YOKE TOO NEAR THE ZERO POSITION,  
(1) POSITION YOKE ACROSS CENTER (THRU ZERO)  
OR (2) STROKE YOKE ACROSS CENTER (THRU ZERO)  
WHILE PUMP IS DRIVING FLUID MOTOR.

## STARTING

BEFORE STARTING, FILL CASE WITH SYSTEM FLUID THRU UPPERMOST DRAIN PORT. HOUSING MUST BE KEPT FULL AT ALL TIMES TO PROVIDE INTERNAL LUBRICATION. CASE PRESSURE SHOULD NOT EXCEED 5 P.S.I.

## INSTALLATION

HEIGHT OF THE UNIT IS NOT LIMITED. A FULL SIZE UNRESTRICTED CASE DRAIN LINE MUST BE CONNECTED FROM THE UPPERMOST DRAIN PORT DIRECTLY TO RESERVOIR IN SUCH A MANNER THAT THE HOUSING REMAINS FILLED WITH FLUID. PIPING OF DRAIN LINE MUST PREVENT SIPHONING. DRAIN LINE MUST TERMINATE BELOW RESERVOIR FLUID LEVEL.

**VICKERS INCORPORATED**  
DIVISION OF SPERRY RAND CORPORATION  
DURESS, MICHIGAN, U.S.A.

ACTIVITY 11

THIS DRAWING RELEASED		11 - 15 - 63	R.M.S.
T-273831		CHECKED 9 - 23 - 63	T.B.
		DRAWN 9 - 16 - 63	G.A.



# VICKERS® VARIABLE DISPLACEMENT PISTON MOTOR WITH HANDWHEEL AND LEVER CONTROLS

## GENERAL DATA

THESE MOTORS ARE OF THE AXIAL PISTON, VARIABLE DISPLACEMENT IN-LINE DESIGN AND PROVIDE POWER FOR A WIDE RANGE OF INDUSTRIAL APPLICATIONS.

## OPERATING CHARACTERISTICS

HORSEPOWER OUTPUT IS APPROXIMATELY PROPORTIONAL TO RPM WITH A GIVEN CONSTANT OPERATING PRESSURE AND CONTROL SETTING. SERVICE MAY BE CONTINUOUS, INTERMITTENT, REVERSING OR STALLED WITHOUT DAMAGE WHEN PROPERLY PROTECTED BY RELIEF VALVE. CAUTION: DIRECTION OF SHAFT ROTATION TO BE OBTAINED BY REVERSING FLOW TO THE MOTOR ONLY AND NOT BY REVERSING MOTOR CONTROL.

OUTPUT SPEEDS ARE DEPENDENT ON INPUT FLOW AND POSITION OF MOTOR CONTROL. SPEED RANGES OF 12:1 (300-3600) AND HIGHER ARE POSSIBLE WITH OUTPUT TORQUES TO 270 LB.-IN. BY VARYING FLOW TO THE MOTOR. WITH CONSTANT FLOW TO THE MOTOR, A SPEED RANGE OF 4:1 IS POSSIBLE BY VARYING MOTOR DISPLACEMENT.

## OPERATING SPECIFICATIONS

THEORETICAL MAXIMUM DISPLACEMENT ..... 64 CU. IN./REV.  
FLOWS ..... 5 GPM FOR RATED SPEED  
10 GPM FOR MAX. SPEED

## OPERATING PRESSURE

\*RATED ..... 1500 PSI  
MAXIMUM (SUM OF INLET AND OUTLET PRESSURE) ..... 3000 PSI

## OPERATING SPEED

\*RATED ..... 1800 RPM  
MAXIMUM ..... 3600 RPM

## OUTPUT TORQUE

AT RATED PRESSURE ..... 135 LB. IN.  
AT MAXIMUM PRESSURE ..... 270 LB. IN.  
\*RATINGS BASED ON CALCULATED 10,000 HOURS 8-10 BEARING LIFE.

## RECOMMENDED MINIMUM OPERATING SPEED

MOTOR SPEEDS DOWN TO 50 RPM ARE POSSIBLE WITH APPROPRIATE CIRCUIT AND APPLICATION CONSIDERATIONS. .... 300 RPM

## CASE PRESSURE

WEIGHT (DRY) ..... 5 PS MAX.  
APPROX. 16 LBS.

## DRIVE ROTATION

MOTORS WILL OPERATE IN EITHER A CLOCKWISE OR COUNTERCLOCKWISE DIRECTION BY REVERSING DIRECTION OF FLUID FLOW.

## FILTRATION

..... 25 MICRONS

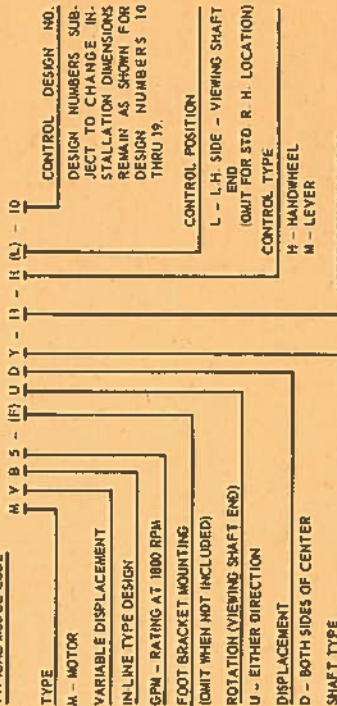
## FLUID

CLEAN PETROLEUM OIL MEETING OR EXCEEDING LUBRICATING QUALITIES OF SAE 10W MEETING API SERVICE CLASSIFICATION AS (MAXIMUM SEVERITY) IS RECOMMENDED. VISCOSITY RANGE 150-225 SSU AT 100° F.

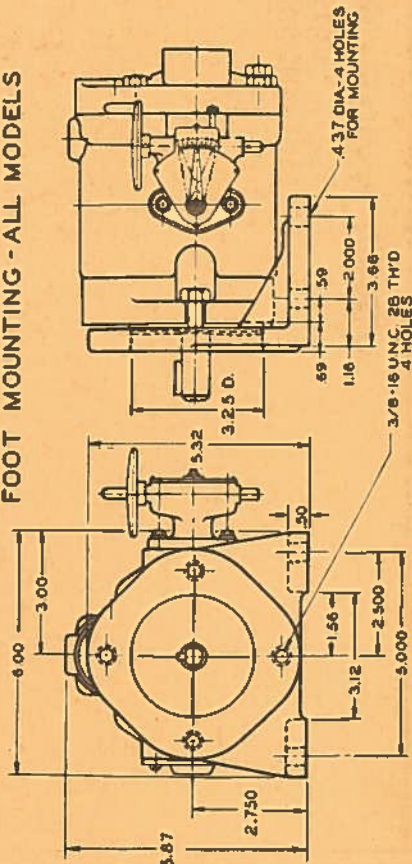
THIS UNIT IS DESIGNED TO MEET SPECIFICATIONS AS OUTLINED, TO INSURE MAXIMUM UNIT PERFORMANCE, IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION, CONSULT YOUR VICKERS APPLICATION ENGINEER IF YOUR:

- PRESSURE REQUIREMENTS ARE ABOVE RATED PRESSURE OF 1500 PSI
- SPEED IS ABOVE 1800 RPM RATING
- SYSTEM REQUIRES MOTOR SPEED BELOW 300 RPM
- SYSTEM REQUIRES FIRE RESISTANT FLUID
- OPERATING TEMPERATURE IS NOT WITHIN 100° F. TO 150° F. WITH PROPER APPLICATION AND FLUID CONSIDERATION, A GREATER TEMPERATURE RANGE IS PERMISSIBLE
- OIL VISCOSITY AT OPERATING TEMPERATURE IS NOT WITHIN 100 TO 250 SSU
- OIL VISCOSITY AT START-UP IS IN EXCESS OF 1000 SSU
- APPLICATION REQUIRES AN INDIRECT DRIVE
- NEEDS REQUIRE APPLICATION ASSISTANCE

## TYPICAL MODEL CODE

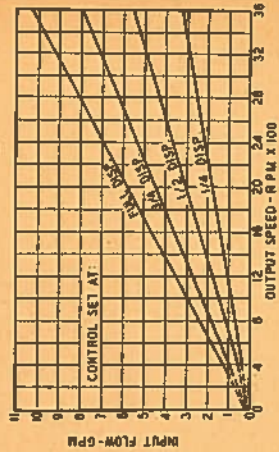
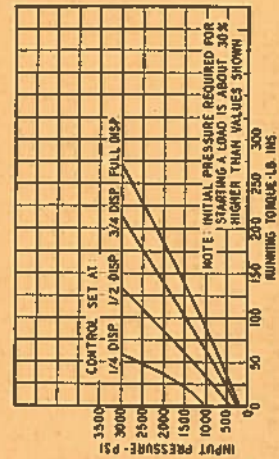


## FOOT MOUNTING - ALL MODELS



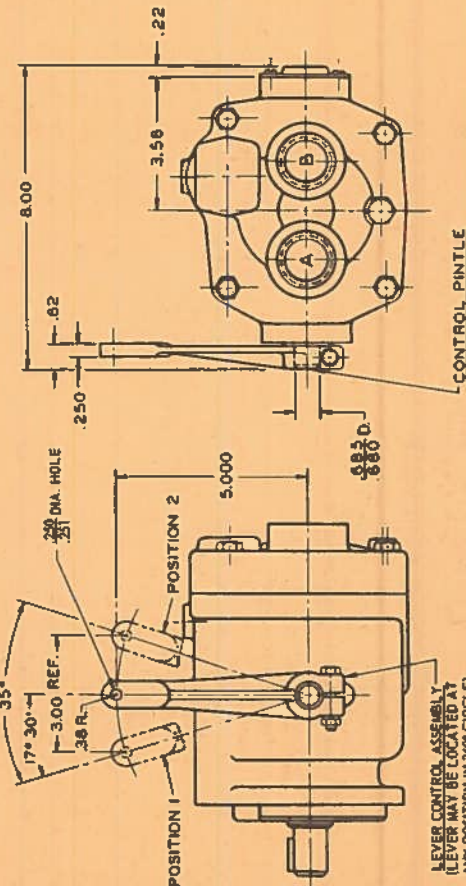
## TYPICAL PERFORMANCE CHARACTERISTICS

BASED ON OIL TEMPERATURE OF 120° F (100 SSU) AND ATMOSPHERIC OUTLET





PISTON MOTOR	MV BIO VARIABLE	3200 RPM	HANDWHEEL &	FLANGE & FOOT	INST. DRWG.
IN-LINE TYPE	DISPLACEMENT	540 LB. IN. TORQUE	LEVER CONTROLS	MOUNTING	I-273838



PROVIDES MECHANICAL OR MANUAL SELECTION OF NO OPERATIONAL DISPLACEMENT OF THE CONTROL LEVER MAY BE PERMITTED ON EITHER ROTARY OR CENTER PIVOTING BEING OPERATED ON EITHER ROTARY OR CENTER PIVOTING. CHARACTERISTICS OF THE CONTROL LEVER MUST BE SECURED BY SUITABLE LINK-AGE ARRANGEMENT TO MAINTAIN DESIRED SETTING. THE CONTROL PIVOT MAY BE PIVOTED 71/2" ON EACH SIDE OF CENTER POSITION TO PERMIT FULL REVERSAL OF INTERNAL SHAFT. TRIPLE TRAVEL IS LIMITED TO 35" IN INTERNAL STOPS. TORQUE REQUIRED TO ROTATE CONTROL PIVOT IS APPROXIMATELY 60 IN. LBS. AT RATED SPEED AND PRESSURE.

SHAFT ROTATION	LEVER POSITION	INLET PORT
R.H.	1	B
R.H.	2	A
L.H.	1	A
L.H.	2	B

PROVIDES MANUAL SELECTION OF MOTOR DISPLACEMENT. HANDWHEEL CONTROLLED UNITS MAY BE OPERATED ON EITHER SIDE OF CENTER PERMITTING BI-DIRECTIONAL OUTPUT ROTATION.

SHAFT ROTATION	POINTER POSITION	HANDWHEEL ROTATION FROM ZERO	INLET PORT
R.H.	1	CLOCKWISE	B
R.H.	2	COUNTER CLOCKWISE	A
L.H.	1	CLOCKWISE	A
L.H.	2	COUNTER CLOCKWISE	B

**CAUTION**

EXCESSIVE OUTPUT SPEED WILL OCCUR IF HAND-  
WHEEL OR LEVER CONTROLS ARE USED TO (1)  
POSITION YOE TOO NEAR THE ZERO POSITION, OR  
(2) STROKE YOKE ACROSS CENTER (THRU ZERO)  
WHILE PUMP IS DRIVING FLUID MOTOR.

## INSTALLATION BEARING

**— 0016 —**

THIS DRAWING RELEASED  
[273838]



# VICKERS. VARIABLE DISPLACEMENT PISTON MOTORS WITH HANDWHEEL AND LEVER CONTROLS

## GENERAL DATA

THESE MOTORS ARE OF THE AXIAL PISTON, VARIABLE DISPLACEMENT IN-LINE DESIGN AND PROVIDE POWER FOR A WIDE RANGE OF INDUSTRIAL APPLICATIONS.

## OPERATING CHARACTERISTICS

HORSEPOWER OUTPUT IS APPROXIMATELY PROPORTIONAL TO RPM WITH A GIVEN CONSTANT OPERATING PRESSURE AND CONTROL SETTING. SERVICE MAY BE CONTINUOUS, INTERMITTENT, REVERSING OR STALLED WITHOUT DAMAGE WHEN PROPERLY PROTECTED BY RELIEF VALVE.

CAUTION: DIRECTION OF SHAFT ROTATION TO BE OBTAINED BY REVERSING FLOW TO THE MOTOR ONLY AND NOT BY REVERSING MOTOR CONTROL.

OUTPUT SPEEDS ARE DEPENDENT ON INPUT FLOW AND POSITION OF MOTOR CONTROL. SPEED RANGES OF 1:1 (300-3200) AND HIGHER ARE POSSIBLE WITH OUTPUT TORQUES TO 540 LB.-IN. BY VARYING FLOW TO THE MOTOR, WITH CONSTANT FLOW TO THE MOTOR, A SPEED RANGE OF 4:1 IS POSSIBLE BY VARYING MOTOR DISPLACEMENT.

## OPERATING SPECIFICATIONS

THEORETICAL MAXIMUM DISPLACEMENT ..... 1.29 CU. IN. REV.  
FLOWS ..... 10.0 GPM FOR RATED SPEED  
18.0 GPM FOR MAX. SPEED

## OPERATING PRESSURE

\*RATED ..... 1500 PSI  
MAXIMUM (SUM OF INLET AND OUTLET PRESSURE) ..... 3000 PSI

## OPERATING SPEED

\*RATED ..... 1800 RPM  
MAXIMUM ..... 3200 RPM

## OUTPUT TORQUE

AT RATED PRESSURE ..... 270 LB. IN.  
AT MAXIMUM PRESSURE ..... 540 LB. IN.

\*RATINGS BASED ON CALCULATED 10,000 HOURS B-10 BEARING LIFE.

## RECOMMENDED MINIMUM OPERATING SPEED

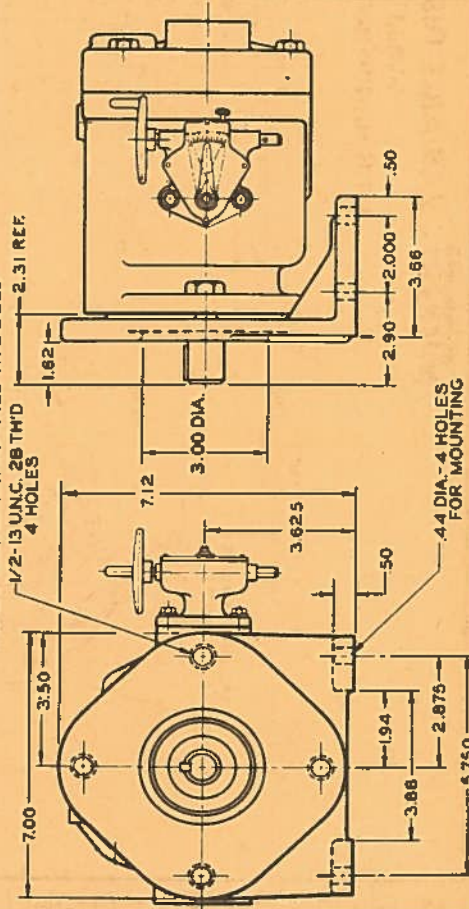
MOTOR SPEEDS DOWN TO 50 RPM ARE POSSIBLE WITH APPROPRIATE CIRCUIT AND APPLICATION CONSIDERATIONS.

## CASE PRESSURE

WEIGHT (DRY) ..... APPROX. 31 LBS.

WITH FOOT MOUNTING ..... APPROX. 36 LBS.

## FOOT MOUNTING-ALL MODELS



## DRIVE ROTATION

MOTORS WILL OPERATE IN EITHER A CLOCKWISE OR COUNTERCLOCKWISE DIRECTION BY REVERSING DIRECTION OF FLUID FLOW.

## FILTRATION

..... 25 MICRONS

## FLUID

CLEAN PETROLEUM OIL MEETING OR EXCEEDING LUBRICATING QUALITIES OF SAE 10W MEETING API SERVICE CLASSIFICATION NO. (MAXIMUM SEVERITY) IS RECOMMENDED. VISCOSITY RANGE 150-225 SSU AT 100°F.

THIS UNIT IS DESIGNED TO MEET SPECIFICATIONS AS OUTLINED. TO INSURE MAXIMUM UNIT PERFORMANCE, IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION, CONSULT YOUR VICKERS APPLICATION ENGINEER IF YOU:

PRESSURE REQUIREMENTS ARE ABOVE RATED PRESSURE OF 1500 PSI

SPEED IS ABOVE 1800 RPM RATING

SYSTEM REQUIRES MOTOR SPEED BELOW 300 RPM

SYSTEM REQUIRES FIRE RESISTANT FLUID

OPERATING TEMPERATURE IS NOT WITHIN 100° F. TO 150° F. WITH PROPER APPLICATION AND FLUID CONSIDERATION, A GREATER TEMPERATURE RANGE IS PERMISSIBLE

OIL VISCOSITY AT OPERATING TEMPERATURE IS NOT WITHIN 100 TO 250 SSU

OIL VISCOSITY AT START-UP IS IN EXCESS OF 1000 SSU

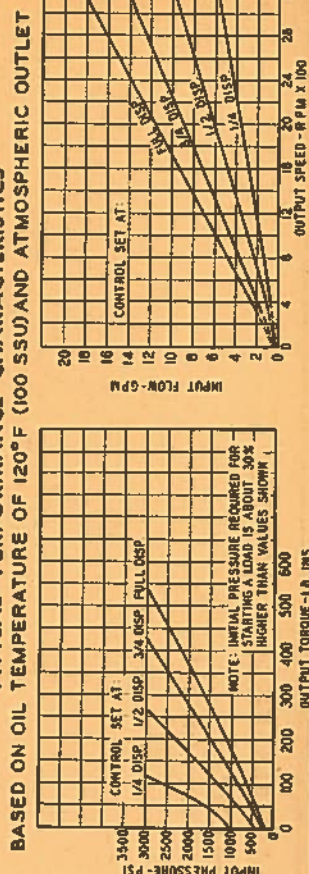
APPLICATION REQUIRES AN INDIRECT DRIVE

NEEDS REQUIRE APPLICATION ASSISTANCE

## TYPICAL MODEL CODE

TYPE M - MOTOR	M V B 10 - (F) U D Y - 20 - H (L) - 10	CONTROL DESIGN NO. DESIGN NUMBERS SUBJECT TO CHANGE. INSTALLATION DIMENSIONS REMAIN AS SHOWN FOR DESIGN NUMBERS 10 THRU 19.
VARIABLE DISPLACEMENT IN-LINE TYPE DESIGN GPM - RATING AT 1800 RPM		CONTROL POSITION L - L.H. SIDE - VIEWING SHAFT END (OMIT FOR STD. R.H. LOCATION)
FOOT BRACKET MOUNTING (OMIT WHEN NOT INCLUDED)		CONTROL TYPE H - HANDWHEEL M - LEVER
ROTATION (VIEWING SHAFT END) U - EITHER DIRECTION		MOTOR DESIGN NUMBER
DISPLACEMENT D - BOTH SIDES OF CENTER		DESIGN NUMBERS SUBJECT TO CHANGE. INSTALLATION DIMENSIONS REMAIN AS SHOWN FOR DESIGN NUMBERS 20 THRU 29.
SHAFT TYPE		

## TYPICAL PERFORMANCE CHARACTERISTICS





# VICKERS. CONSTANT DISPLACEMENT PISTON TYPE FLUID MOTORS

## THREADED CONNECTIONS

MODEL NUMBERS INDICATE PISTON TYPE MOTORS OF CONSTANT DISPLACEMENT, THE OPERATING PRESSURE AND CAPACITY, HOUSING-ANGLE, TORQUE, DESIGN AND MODIFICATION NUMBER.

THEORETICAL TORQUE IS INDICATED IN THE TABULATION AND IS THE TORQUE DEVELOPED FOR EACH 100 PSI INLET PRESSURE. TOTAL THEORETICAL TORQUE = ACTUAL RATING X OPERATING PRESSURE/100.

ACTUAL RUNNING TORQUE IS APPROXIMATELY 95% OF THE TOTAL THEORETICAL TORQUE AT THE ACTUAL OPERATING PRESSURE FOR CONSTANT SPEED AND DISPLACEMENT. STALLED TORQUE IS ABOUT 95% OF THE RUNNING TORQUE.

RECOMMENDED MAXIMUM SPEED AS INDICATED IN TABULATION IS MAXIMUM RPM FOR NORMAL OPERATING CONDITIONS. WHERE INSTALLATIONS REQUIRE DRIVE SPEEDS EXCEEDING MAXIMUM SHOWN, VICKERS RECOMMENDATIONS SHOULD BE OBTAINED.

RECOMMENDED MINIMUM SPEED VARIES WITH CONDITIONS. RECOMMENDATIONS SHOULD BE OBTAINED FOR A GIVEN APPLICATION AND SIZE OF UNIT WHEN LESS THAN 50 RPM.

MAXIMUM OPERATING PRESSURE-----3000 PSI  
WHEN PRESSURES ABOVE 2000 PSI (CONTINUOUS) ARE REQUIRED, RECOMMENDATIONS SHOULD BE OBTAINED. WHEN UNITS ARE USED IN OTHER THAN NORMAL OPERATING CONDITIONS, POWER TRANSMISSION CAPACITY, CONSIDERING SPEED, TEMPERATURE, ETC., THE SUM OF THE INLET AND OUTLET PRESSURES SHOULD NOT EXCEED 3000 PSI.

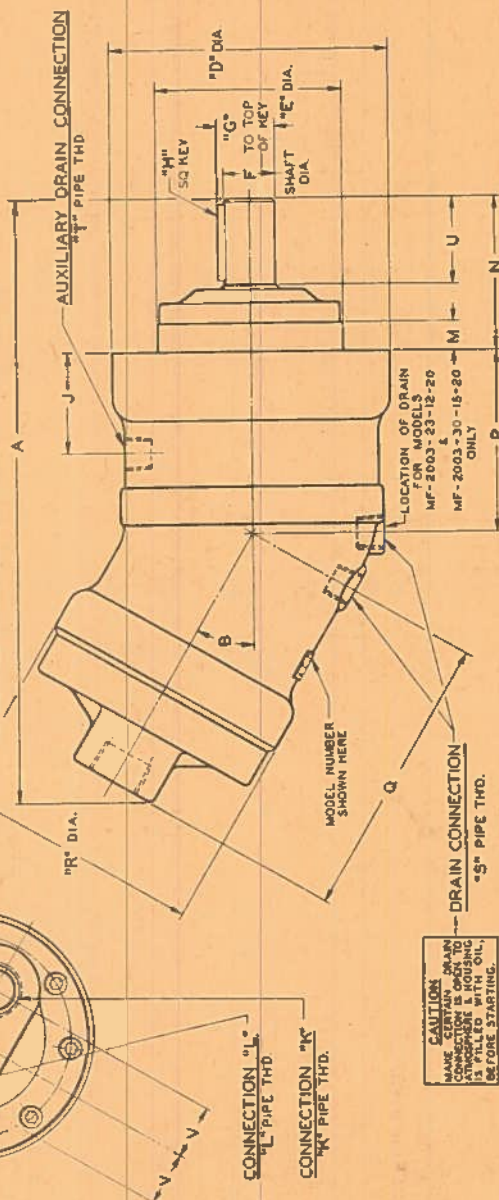
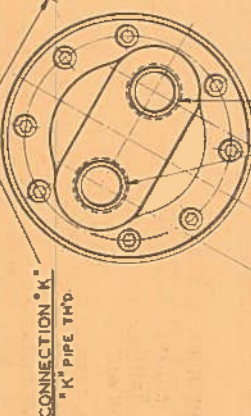
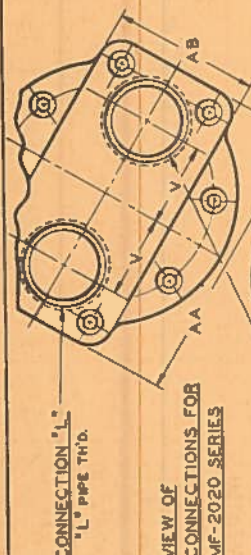
DISPLACEMENT TABULATED IS AT ZERO INLET PRESSURE. VOLUMETRIC EFFICIENCIES VARY BETWEEN 87% AND 92% AT AVERAGE RECOMMENDED SPEEDS AND PRESSURES.

SERVICE MAY BE CONTINUOUS, INTERMITTENT, CONTINUOUS REVERSING OR STALLED WITHOUT DAMAGE WHEN PROPERLY PROTECTED BY RELIEF VALVE.

OPERATING CHARACTERISTICS ARE OF THE VARIABLE HORSEPOWER CLASS. H.P. BEING PROPORTIONATELY PROPORTIONAL TO RPM WITH A GIVEN CONSTANT OPERATING PRESSURE.

DESIGN RECOMMENDATION IS DEPENDENT UPON OPERATING PRESSURE, SPEED AND SIZE OF UNIT. APPROXIMATE AVERAGE RPM TO 95% AT RECOMMENDED CONDITIONS.

OR VISCOSITY OF 219-315 S.S.U. AT 100° F. FOR AMBIENT TEMPERATURES FROM 50° F. TO 150° F. IS RECOMMENDED. RECOMMENDED OPERATING TEMPERATURE IS 120° F. REFER TO DATA SHEET 288-A FOR RECOMMENDED HYDRAULIC OIL SPECIFICATIONS.



CAUTION  
MAKE CERTAIN DRAIN  
CONNECTION IS NOT  
CLOGGED AND HOUSING  
IS FILLED WITH OIL  
BEFORE STARTING.

KEEP HOUSING FILLED AT ALL  
TIMES AND PREVENT SYNCHRONIZING ACTION. PISTON PUMPS  
OR MOTORS DEPEND ON THE DRAINING OIL FOR LUBRICATION  
OF INTERNAL PARTS.

DIRECTION OF SHAFT ROTATION

WHEN CONNECTION "L" IS INLET  
SHAFT ROTATES IN DIRECTION OF ARROW

WHEN CONNECTION "K" IS INLET  
SHAFT ROTATES IN DIRECTION OPPOSITE TO ARROW

(FOUR-WAY VALVE ACTION MAY BE USED IN OTHERS. CHECK  
WHEN REVERSING SERVICE IS REQUIRED)

MODEL NUMBER	MAXIMUM R.P.M.	DISPLACEMENT CU. IN. / REV.	TORQUE LB. IN. / 100 PSI	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V	W	X	AA	AB	WT. LBS.
MF-2003-23-12-20	3400	.76	12	8 1/2	23 1/2	2 1/2	3 1/2	2 1/2	2 1/2	2 1/2	2 1/2	1 1/2	1 1/2	1 1/2	1 1/2	2	3 1/2	3 1/2	3 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	20
MF-2003-30-15-20	3800	.95	15	8 1/2	30 1/2	2 1/2	3 1/2	2 1/2	2 1/2	2 1/2	2 1/2	1 1/2	1 1/2	1 1/2	1 1/2	2	4 1/2	4 1/2	4 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	30
MF-2008-23-30-20	2800	1.82	30	12 1/2	23 1/2	3 1/2	5 1/2	3 1/2	3 1/2	3 1/2	3 1/2	1 1/2	1 1/2	1 1/2	1 1/2	3	4 1/2	5 1/2	4 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	50
MF-2008-30-30-20	2200	2.41	36	12 1/2	30 1/2	4	5 1/2	3 1/2	3 1/2	3 1/2	3 1/2	1 1/2	1 1/2	1 1/2	1 1/2	3 1/2	5 1/2	6 1/2	5 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	50
MF-2012-23-45-20	2400	3.05	48	15 1/2	23 1/2	4 1/2	6 1/2	4 1/2	4 1/2	4 1/2	4 1/2	1 1/2	1 1/2	1 1/2	1 1/2	3 1/2	5 1/2	6 1/2	5 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	50
MF-2012-30-61-20	1900	3.82	61	15 1/2	30 1/2	5 1/2	6 1/2	4 1/2	4 1/2	4 1/2	4 1/2	1 1/2	1 1/2	1 1/2	1 1/2	3 1/2	5 1/2	6 1/2	5 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	50
MF-2030-23-76-20	2000	4.77	76	18 1/2	23 1/2	5 1/2	6 1/2	4 1/2	4 1/2	4 1/2	4 1/2	1 1/2	1 1/2	1 1/2	1 1/2	3 1/2	5 1/2	6 1/2	5 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	75
MF-2030-30-95-20	1600	5.90	95	18 1/2	30 1/2	5 1/2	6 1/2	4 1/2	4 1/2	4 1/2	4 1/2	1 1/2	1 1/2	1 1/2	1 1/2	3 1/2	5 1/2	6 1/2	5 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	75

EXAMPLE OF MODEL NUMBER

MODEL MF-2012-30-61-20  
DESIGN 20  
DESIGN NUMBERS SUBJECT TO CHANGE.  
INSTALLATION DIMENSIONS REMAIN AS  
SHOWN FOR DESIGN NUMBERS 10 THRU 18  
AND 20 THRU 28.

REVISED 4-1-80 WH3

Vickers Inc.  
INSTALLATION DRAWING  
1.136014

FLUID  
MOTORS

CONSTANT  
DISPLACEMENT

MULTIPLE PISTON  
ROTARY TYPE

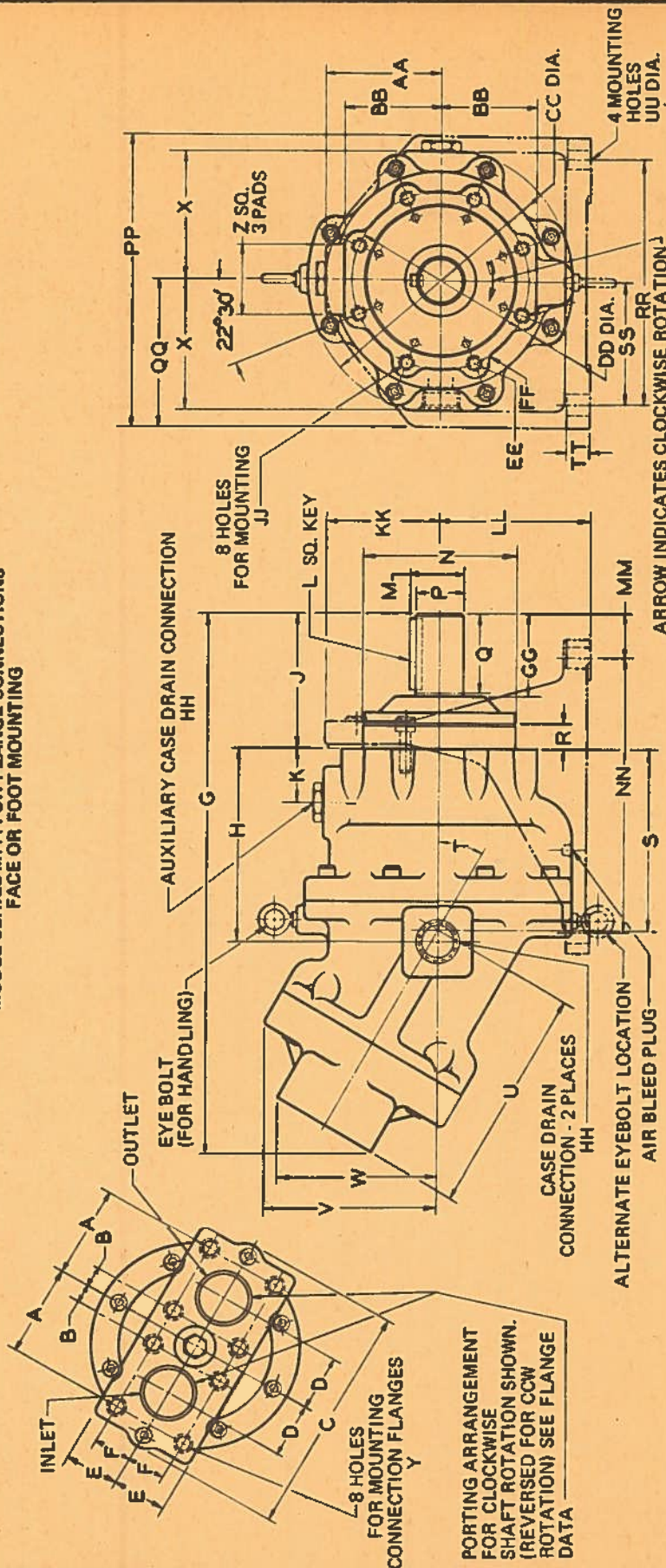
12 TO 238 #/100  
TORQUE RATING

FACE  
MOUNTING

INST. DRWG.  
I.136014



# **VICKERS® FIXED DISPLACEMENT ANGLE-TYPE PISTON MOTORS** MODEL SERIES MFA FOR FLANGE CONNECTIONS FACE OR FOOT MOUNTING



REVISED 6-1-72

MODEL SERIES	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V	W	X	Y
MFA50-23	4.000	.750	9.50	2.375	2.38	1.625	22.72	8.00	5.69	2.12	.375	1.922	6.499	1.7495	2.69	1.125	7.31	23°30'	9.19	6.00	5.88	5.88	.625-11 UNC-28 THD. 1.25 DEEP
MFA50-30							22.12					1.912	6.495	1.7490				30°		6.62	6.66		
MFA120-23	4.750	1.000	12.12	2.875	2.81	1.875	28.62	10.06	7.06	2.81	.625	2.779	7.999	2.4995	4.12	1.312	9.44	23°30'		8.53	7.00		.875-9 UNC-28 THD. 1.25 DEEP
MFA120-30 & MFA150-30							28.12					2.769	7.995	2.4990				30°	11.75	9.14	8.38	6.62	
MODEL SERIES	Z	AA	BB	CC	DD	EE	FF	GG	HH	JJ	KK	LL	MM	NN	PP	QQ	RR	SS	TT	UU			
MFA50-23	3.25	5.00	4.20	11.75	7.750	.62	1.00	2.86	1.312-12 UN-28 THD. (FOR 1" O.D. TUBING)	.500-13 UNC-28 THD. 1.12 DEEP	4.75	7.750 ±.005	1.44	11.500	11.50	5.75	9.875	4.938	1.06	.78			
MFA50-30																							
MFA120-23 & MFA120-30	3.75	6.00	5.12	13.88	9.375	.75	.75	4.25	1.875-12 UN-28 THD. (FOR 1-1/2" O.D. TUBING)	.750-10 UNC-28 THD. 1.50 DEEP	6.00 ±.005	8.000 ±.005	2.31	14.250	15.00	7.50	13.000	6.500	1.44	1.06			
MFA150-30																							5205000

VICKERS DIVISION  
 OF SPERRY RAND CORPORATION  
 TROY, MICHIGAN 48064

PISTON MOTORS  
 (ANGLE TYPE)

MFA SERIES  
 FIXED DISPLACEMENT

NOMINAL 50,  
 120 & 150  
 GPM

RATED  
 2500 &  
 3000 PSI

FACE OR  
 FOOT MOUNTING

DWG. NO.  
 520500



# GENERAL DATA

THESE MOTORS ARE OF THE VARIABLE HORSEPOWER CLASS, HP OUTPUT BEING APPROXIMATELY PROPORTIONAL TO RPM WITH A GIVEN CONSTANT OPERATING PRESSURE. MOTOR OPERATION MAY BE CONTINUOUS, INTERMITTENT, REVERSING OR STALLED WITHOUT DAMAGE WHEN PROPERLY PROTECTED BY A RELIEF VALVE.

## OPERATING SPECIFICATIONS

MODEL SERIES	DISPL. AT 0 PSI (CU. IN. /REV.)	THEORETICAL TORQUE (LB.-IN.)	OPERATING SPEED (RPM)		PRESSURE (PSI)		OUTPUT SPEED (RPM)		WEIGHT (LBS.) APPROX.	
			MIN.	MAX.	RATED	*MAX.	(GPM) (THEO)	(FT. MTG.)		
MFA50-23	7.56	120	50	2400	3000	5000	30	215	265	
MFA50-30	9.48	151	50	2400	3000	5000	24	215	265	
MFA120-23	18.91	300	50	1800	3000	5000	12	425	550	
MFA120-30	23.71	378	50	1800	3000	5000	10	425	550	
MFA150-30	28.96	450	50	1200	2500	3000	8	425	550	

\*SUM OF INLET AND OUTLET PRESSURES

NOTE: VICKERS ENGINEERING APPROVAL IS REQUIRED FOR ALL APPLICATIONS WITH SPEEDS ABOVE 1200 RPM.

## INSTALLATION

POSITIONAL ATTITUDE OF THE MOTOR IS NOT LIMITED. A FULL SIZE UNRESTRICTED DRAIN LINE MUST BE CONNECTED DIRECTLY FROM THE CASE DRAIN CONNECTION TO THE RESERVOIR. PIPING OF DRAIN LINE MUST KEEP CASE FILLED AT ALL TIMES AND PREVENT SYNCHRONOUS ACTION.

PRESSURE SURGES AT THE CASE DRAIN CONNECTION MAY NOT EXCEED 20 PSI. NOMINAL PRESSURE NOT TO EXCEED 15 PSI.

IF RESERVOIR IS ABOVE MOTOR AN ADEQUATE AIR VENT TO ATMOSPHERE ABOVE RESERVOIR FLUID LEVEL MUST BE PROVIDED TO INSURE COMPLETE FILLING OF MOTOR CASE.

CIRCUIT MUST PROVIDE FOR CIRCULATION OF COOL OIL THROUGH PUMP HOUSING FROM BOTTOM TO TOP DRAIN CONNECTION.

MFA50 SERIES: 1200 RPM - CIRCULATE 2 GPM

1800 RPM - CIRCULATE 4 GPM

MFA120 SERIES: 1200 RPM - CIRCULATE 3 GPM

1800 RPM - CIRCULATE 5 GPM

MFA150 SERIES: CIRCULATE 3 GPM

CASE PRESSURE OF 10 PSI ±5 MUST BE MAINTAINED WHEN OPERATING AT SPEEDS ABOVE 1200 RPM. IF NECESSARY, 5 OR 10 PSI CHECK VALVE MAY BE USED IN THE CASE-COOLING OIL CIRCUIT TO OBTAIN CASE PRESSURE.

## STARTING

BEFORE INITIAL START UP, FILL CASE WITH SYSTEM FLUID THRU UPPERMOST DRAIN PORT. HOUSING MUST BE KEPT FULL AT ALL TIMES TO PROVIDE INTERNAL LUBRICATION.

## DRIVE ROTATION

UNITS MAY BE OPERATED IN EITHER DIRECTION. MOTOR IS ILLUSTRATED FOR COUNTERCLOCKWISE ROTATION.

VOLUMETRIC EFFICIENCY (3000 PSI, 1200 RPM)..... APPROX. 96%

OVERALL EFFICIENCY (3000 PSI, 1200 RPM)..... APPROX. 95%

## OUTPUT TORQUE

WITH OUTPUT SHAFT RUNNING..... APPROX. 95% OF THEORETICAL TORQUE  
WITH OUTPUT SHAFT STALLED..... APPROX. 91% OF THEORETICAL TORQUE  
FILTRATION RECOMMENDED..... 25 MICRONS  
(INCLUDING CIRCULATING CASE-COOLING OIL)

## FLUID

CLEAN PETROLEUM OIL OF VISCOSITY RANGE 225 TO 325 SSU AT 100° F., MEETING OR EXCEEDING LUBRICATING QUALITIES OF SAE SERVICE CLASSIFICATIONS SC, SD OR SE OF SAE J183 IS RECOMMENDED. REFER TO DATA SHEET 1-286-S (SECTION L) FOR HYDRAULIC OIL RECOMMENDATIONS.

THESE MOTORS ARE DESIGNED TO MEET SPECIFICATIONS AS OUTLINED. TO INSURE MAXIMUM UNIT PERFORMANCE IN CONJUNCTION WITH YOUR SPECIFIC APPLICATION, CONSULT YOUR VICKERS APPLICATION ENGINEER IF YOUR PRESSURE REQUIREMENTS ARE ABOVE RATED PRESSURES.

SPEED IS ABOVE 1200 RPM OR BELOW 50 RPM.

SYSTEM REQUIRES FIRE-RESISTANT FLUID.

OPERATING TEMPERATURE IS NOT WITHIN 100° F. TO 150° F. WITH PROPER APPLICATION AND FLUID CONSIDERATION, A GREATER TEMPERATURE RANGE IS PERMISSIBLE.

OIL VISCOSITY AT START UP IS IN EXCESS OF 1000 SSU.

APPLICATION REQUIRES AN INDIRECT DRIVE.

NEEDS REQUIRE APPLICATION ASSISTANCE.

MODEL CODE MFA 120 - 30 - F - U - 10

MOTOR

FIXED DISPLACEMENT

ANGLE-TYPE

SERIES SIZE

50, 120 OR 150

DISPLACEMENT ANGLE

23 - 23° 30'

30 - 30°

DESIGN NUMBER

SUBJECT TO CHANGE. INSTALLATION DIMENSIONS REMAIN AS SHOWN FOR DESIGN NUMBERS 10 THRU 19.

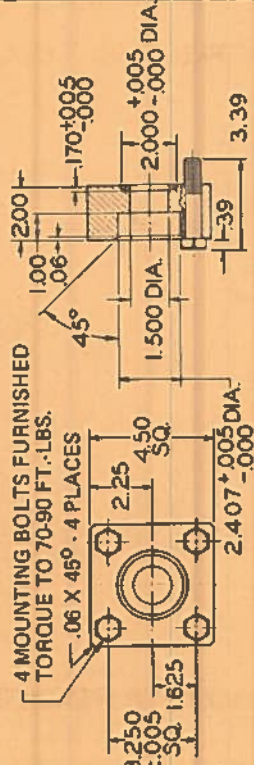
ROTATION

EITHER DIRECTION

MOUNTING TYPE

F - FOOT (OMIT FOR FACE MTG.)

FLANGE MODEL FL450-16WS-10 FOR 5000 PSI MFA50 MOTORS



INLET AND OUTLET FLANGES FOR THREADED AND SOCKET WELD PIPE CONNECTIONS ARE TABULATED BELOW. SEE DRAWING 522900 FOR ADDITIONAL FLANGE INFORMATION FOR SERIES MFA120 AND MFA150.

MODEL SERIES	CONNECTION FLANGE		PIPING SIZE	FLANGE DESIGN
	MODEL NUMBER	THREADED		
MFA120 & MFA150	FL-20-WS-20	FL-20-PS-20	2-1/2"	STRAIGHT ELL
	FL-20-WL-20	FL-20-PL-20	2-1/2"	STRAIGHT ELL
	FL-24-WS-20	FL-24-PS-20	3"	STRAIGHT ELL
	FL-24-WL-30	FL-24-PL-20	3"	STRAIGHT ELL

FLANGES TABULATED ABOVE ARE RATED FOR 3000 PSI. STRAIGHT FLANGES WITH SAE GRADE 8 SCREWS FOR USE TO 5000 PSI CAN BE SUPPLIED. SPECIFY BY ADDING "HP" TO MODEL NUMBER. EXAMPLE: FL-20-WS-HP-20. TORQUE "HP" FLANGE SCREWS TO 175-200 FT. LBS.

STANDARD GRAPHICAL SYMBOL FOR FLUID POWER DIAGRAMS

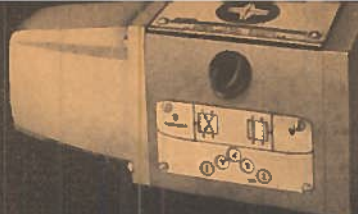





# DIRECTIONAL CONTROLS

Sperry Vickers directional valves offer the ultimate in compactness and versatility of application for the many directional control requirements of hydraulic machinery. Ruggedness of design, controlled manufacturing quality and world-wide parts interchangeability are important parts of the overall story. Even on the most exacting industrial applications, you'll find our directional controls keep your maintenance simple and downtime at a minimum.

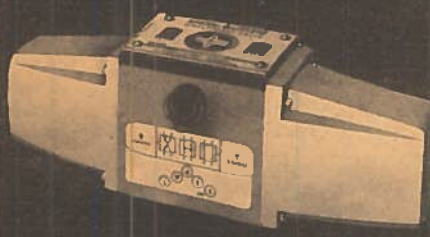





AIR-GAP SOLENOID



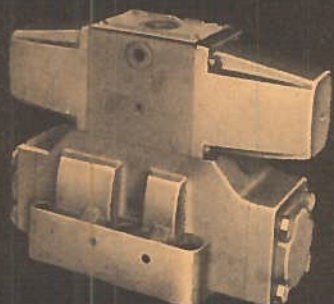
WET ARMATURE SOLENOID



AIR-GAP SOLENOIDS



WET ARMATURE SOLENOIDS



AIR-GAP SOLENOIDS



WET ARMATURE SOLENOIDS

#### **single solenoid—spring offset**

In these units, the valve spool is shifted by energizing a solenoid located at one end of the spool. When the solenoid is de-energized the spring at the opposite end of the spool returns the spool to its original position.

#### **double solenoid—spring centered**

Two solenoids are used, one at each end of the spool to shift the spool in either direction from the center position. Springs return the spool to center position when both solenoids are de-energized.

#### **double solenoid—no spring (detented)**

In no-spring (detented) double-solenoid models spool is positioned in two extreme positions according to which solenoid is energized. The detenting uses a unique design that fits into the shifting mechanism.

#### **single or double solenoid, pilot operated**

These units are comprised of a single or double solenoid control valve that is used as a pilot or "master" valve to direct flow to either end of a larger "slave" valve. The master valve is mounted on top of the slave valve and can be a spring offset, spring centered or no-spring (detented) type. The slave valve can be a spring centered, pressure centered or no-spring type.



#### **miniature directional valves**

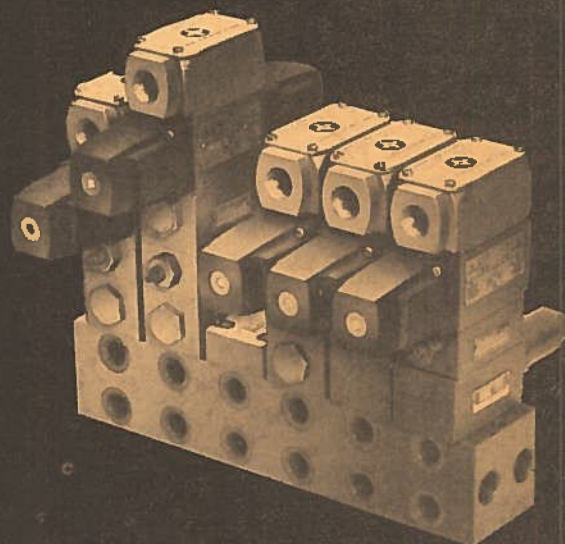
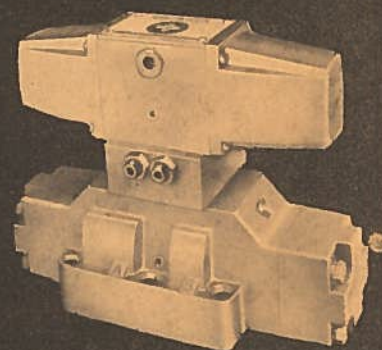
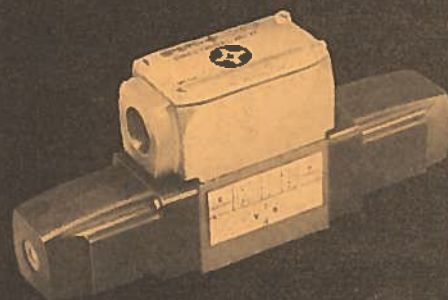
Single and double solenoid, manifold or subplate mounted models are available and are rated at 5 gpm and 5000 psi.

#### **pilot choke**

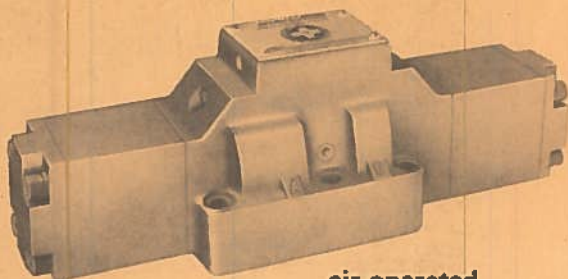
Choke adjustments are provided for accurate pilot flow control and for smooth controlled reversing action and dwell. Add suffix "2" to model, i.e. DG5S4-069-2.

#### **modular valves**

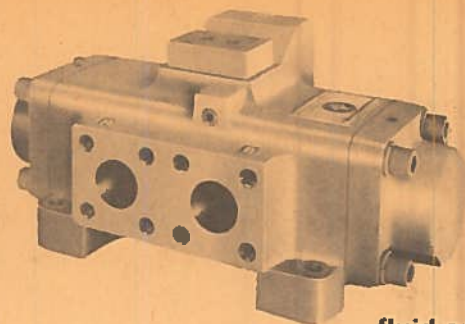
Sperry Vickers modular valves mount between directional valve and manifold or subplate, making one neat, leak-resistant, hydraulic system. This line consists of sequence, pressure reducing, flow, check and relief valves. Far less installation space is required on machines than with conventional valving. Piping requirements are greatly reduced, thus lowering costs and simplifying maintenance.







**air operated**



**fluid operated**

### **MANIFOLD OR SUBPLATE MOUNTING**

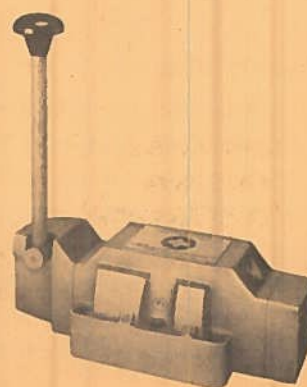
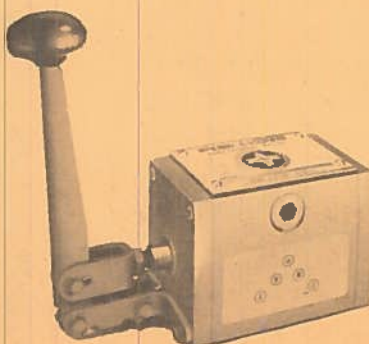
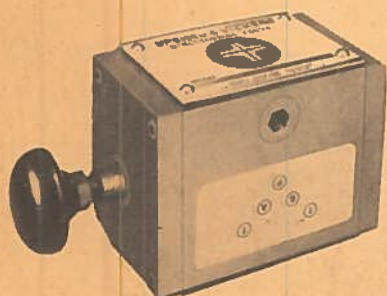
Manifold or subplate mounting method reduces installation problems to a minimum. Entire valve can be removed without disconnecting any lines or disturbing any pipe connections. The installation appears much neater, as all the piping is hidden behind the plates.

### **FLANGED CONNECTION MODELS**

For ease of installation, the larger sizes of Sperry Vickers Pilot Operated Four-way Valves are available with flanged connections.

### **TWO AND FOUR-WAY MANUALLY OPERATED VALVES**

Applications requiring either two or four-way directional valves can be supplied with either knob or lever operated models. Valves are available in spring offset, spring centered or no spring detented positioned models.





**rotary directional valve  
panel mounting type  
SERIES C-529**

Integral flange with two bolt or stud holes permits mounting so that only flange and lever project from panel face.

**check valve  
manifold or subplate mounting  
SERIES CG-800**

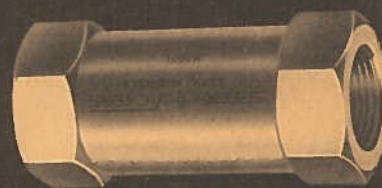
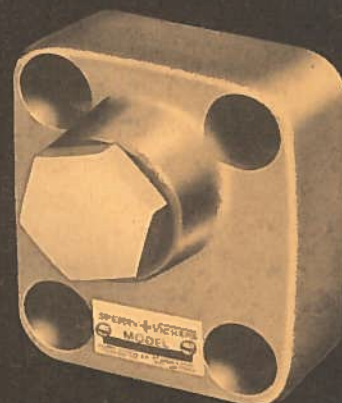
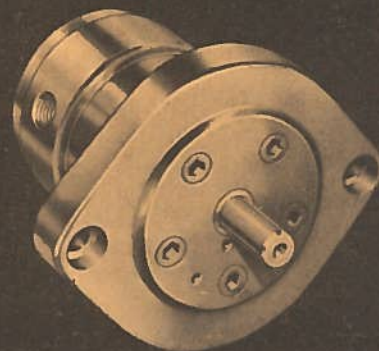
For mounting on machined manifold or subplate with threaded connections at reverse side. Valve can thus be mounted without connecting piping to valve proper, for greater ease of installation and to conceal piping within machine frame.

**check valve  
in-line type  
SERIES DT8P1**

These valves are of simple spring closed construction for non-shock operating pressures to 3000 psi.

**check valve  
right angle  
SERIES C-800**

These valves are recommended where it is necessary to check a high velocity reverse flow.





# INDEX

## SECTION F - DIRECTIONAL CONTROL VALVES

DESCRIPTION	MOUNTING & NOMINAL SIZE	DWG. NO.	PAGE NO.
Manual Pilot - 2 and 4 way			
C2-500/1500 rotary	Threaded 1/4 Subplate 1/4	514200	f - 1
C-552/572-E plunger oper'd.	Threaded 1/4	514300	f - 3
C-552/572-K knob oper'd.	Threaded 1/4	514300	f - 3
DG17V/20V-3 lever and cam/roller	Subplate 1/4	514380	f - 5
DG2S2/4 plunger oper'd.	Subplate 1/8	514400A	f - 8
DG1/17 knob and lever offset and detented	Subplate 1/8	514500	f - 10
DG1/17 knob and lever spring centered & detented	Subplate 1/8	514600	f - 12
Manual - 4 way			
C-476/478 stem & lever	Threaded 3/8	515500	f - 14
C-430 stem & lever	Threaded 3/4	3288	f - 16
DG17-060 lever	Subplate 3/4	514700	f - 17
DG17-100 lever	Subplate 1-1/4	514705	f - 19
Deceleration - plunger operated			
DG16	Subplate 1/8	514400A	f - 8
C-700	Threaded 3/4 to 1-1/4	137498	f - 21
CG-714	Subplate 3/4	172902	f - 22
DT15	Threaded 3/4	515300	f - 23
DG15	Subplate 3/4	515300	f - 23
Air Controlled			
DG18S4-01 air operated	Subplate 1/8	516650	f - 25
DG18S4-06 air operated	Subplate 3/4	516810A	f - 29
DG19S4-06 pilot operated	Subplate 3/4	517905A	f - 33
DG19S4-10 pilot operated	Subplate 1-1/4	518005	f - 37

### MODEL CODES

Model codes in this catalog list many options. Some possible model combinations are not readily available. Please contact your Sperry Vickers representative to verify availability.



# INDEX

## SECTION F - DIRECTIONAL CONTROL VALVES (CONT'D)

DESCRIPTION	MOUNTING & NOMINAL SIZE	DWG. NO.	PAGE NO.
<b>Pilot Operated</b>			
DG3S4-04	Subplate 1/2	516710	f - 41
DG3S4-06	Subplate 3/4	516800A	f - 45
DG3S4-H06	Subplate 3/4	516820	f - 49
DG3S4-10	Subplate 1-1/4	517000	f - 53
DF3S4-16	Flange 2	517100	f - 57
<b>Solenoid Controlled</b>			
DG4V-3 solenoid operated	Subplate 1/4	517350	f - 61
DG4V-3 modules and accessories	Subplate 1/4	517355	f - 65
DG4V-3 adapter plate		517360	f - 74
DG4S2/4-01 solenoid operated	Subplate 3/8	517401A	f - 75
DG4S2/4-01**-W solenoid operated	Subplate 3/8	517410	f - 81
DG5S4-04 sol. controlled/pilot operated	Subplate 1/2	517810	f - 86
DG5S4-06/H06/10 sol. controlled/ pilot operated	Subplate 3/4 to 1-1/4	517850	f - 90
DG5S4-06 sol. controlled/pilot operated	Subplate 3/4	517900A	f - 98
DG5S4-H06 sol. controlled/pilot operated	Subplate 3/4	517920	f - 104
DG5S4-10 sol. controlled/pilot operated	Subplate 1-1/4	518000A	f - 110
DF5S4-16 sol. controlled/pilot operated	Flange 2	518100	f - 116
<b>Check Valves</b>			
DT8P1 inline type	Threaded 1/4 to 1-1/4	518300	f - 124
C2-800 angle type	Threaded 1/4 to 2	518400	f - 126
C5G-805	Subplate 3/8	518450	f - 127
C5G-815	Subplate 3/4	518500A	f - 129
C5G-825	Subplate 1-1/4	518700	f - 131
DF10P1 angle type	Flange 1-1/2 to 3	518800	f - 133
<b>Check Valves Remote Pilot and Pressure Operated</b>			
4CT-03, 06 and 10 remote pilot	Threaded 3/8 to 1-1/4	519000	f - 135
4CG-03, 06 and 10 remote pilot	Subplate 3/8 to 1-1/4	519010	f - 137
DGPC-01 pressure operated	Modular 1/8	518890	f - 139
DGPC-06 pressure operated	Modular 3/4	518895	f - 141

### MODEL CODES

Model codes in this catalog list many options. Some possible model combinations are not readily available. Please contact your Sperry Vickers representative to verify availability.



# NOTES



**SPERRY VICKERS**  
TROY, MICHIGAN 48064

**DIRECTIONAL CONTROLS**

**FOUR-WAY PILOT VALVES**

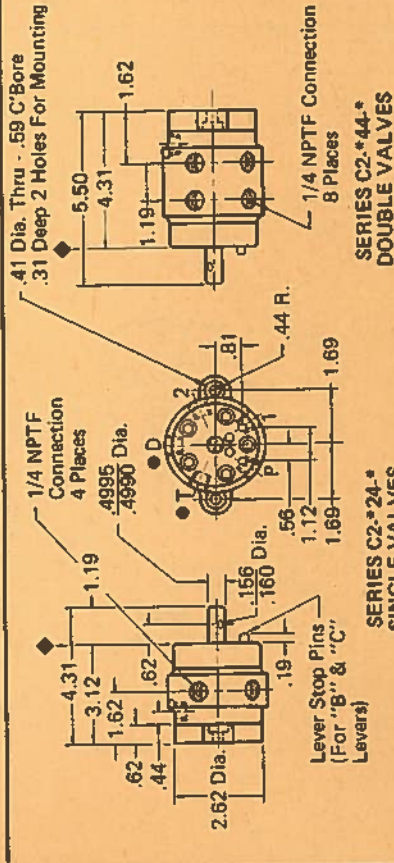
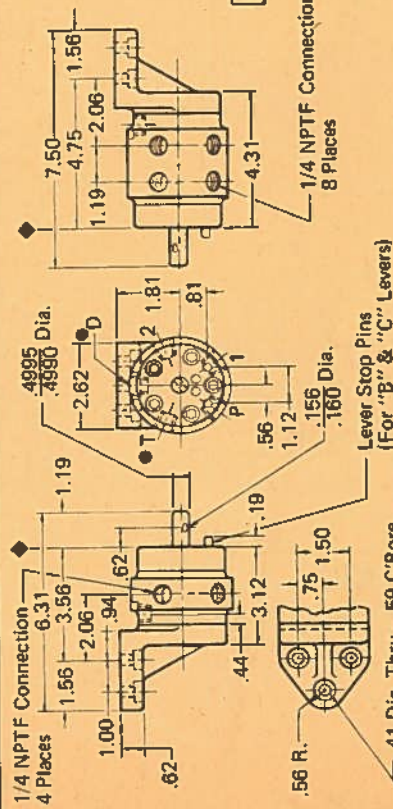
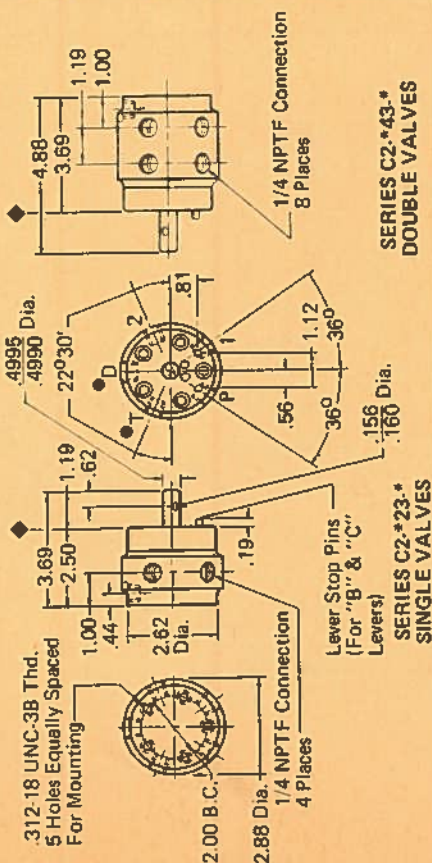
**ROTARY TYPE**

**FOR 1/4 & 3/8 PIPING**

**MANUALLY OR MECHANICALLY OPERATED**

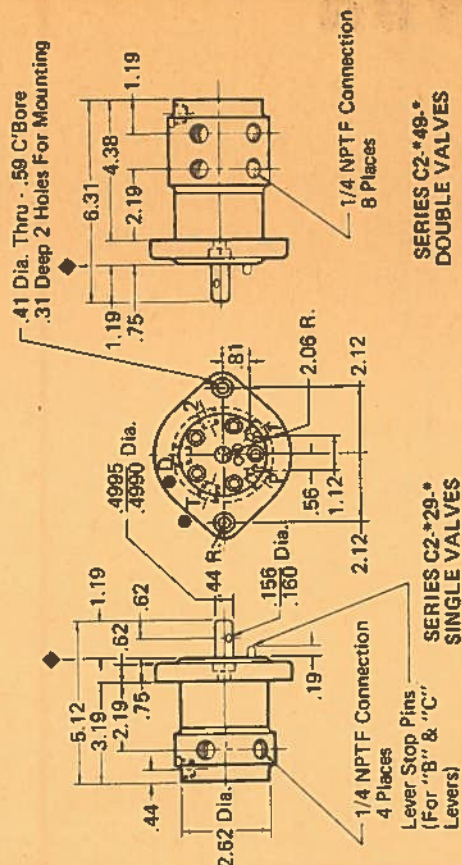
**THREADED CONNECTIONS OR MANIFOLD MOUNTING**

**DWG. NO. 514200**

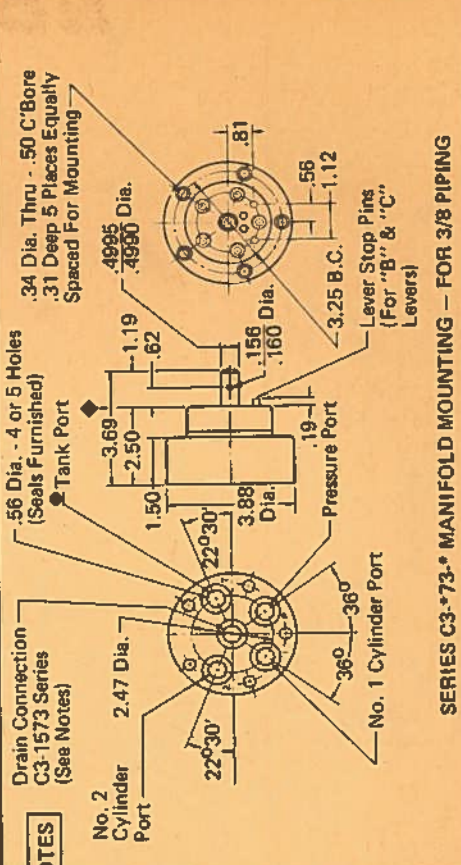


**SPERRY VICKERS**  
**ROTARY TYPE**  
**4 - WAY DIRECTIONAL VALVES**

MANUALLY OR MECHANICALLY OPERATED  
THREADED CONNECTIONS OR MANIFOLD MOUNTING



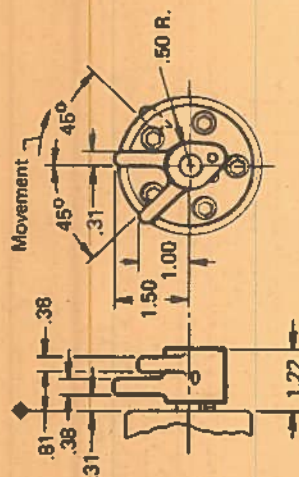
● SEE NOTES



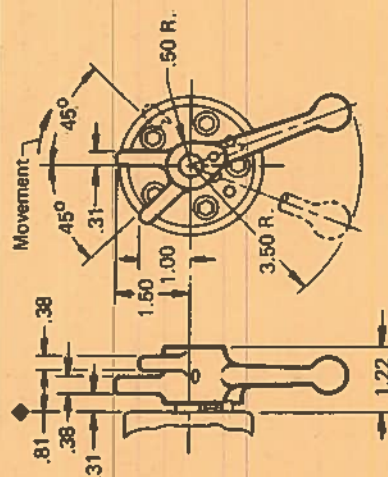
Note: Symbol (●) denotes corresponding dimension points on valve and lever views. See reverse side.  
"P" denotes pressure inlet connection.  
"1" denotes No. 1 control circuit connection.  
"2" denotes No. 2 control circuit connection.  
"T" denotes tank discharge connection.  
"D" denotes 1/4 NPTF external drain connection (available in C-1500 series only)



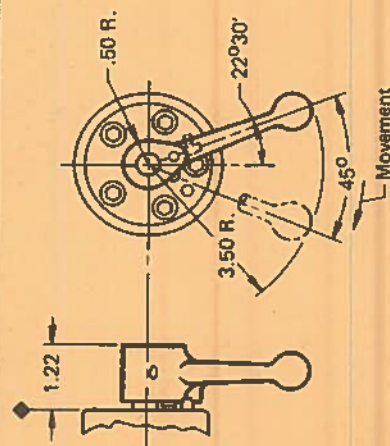
# TYPES OF OPERATING LEVERS



Reversing Dog Operation  
Type "A" Lever



Reversing Dog & Manual Operation  
Type "B" Lever



Manual Operation  
Type "C" Lever

## General Usage

For remote control of other valves in the hydraulic system; sequential or series control of hydraulic circuit functions, as a pilot interlock, or for venting balanced piston type relief valves.

## Construction

Valves are of the closed center type which blocks oil flow between pressure, tank, and cylinder ports during valve spool crossover. Pressure is thus maintained in the system for operation of other valving.

Direction of Oil Flow For Lever Position Indicated	
Lever Position	Direction of Oil Flow
45° Counterclockwise (shown)	P → 1; 2 → T
45° Clockwise	P → 2; 1 → T
Neutral (Crossover)	All Ports Blocked

■ Lever movement without changing direction of oil flow is approx. 8° from either extreme position. Lever is in neutral when located approx. 22°30' from either extreme position. These valves are of the no-spring type. They remain in the position last shifted providing there is no shock, vibration or unusual pressure transients.

Flow Capacity GPM (Max.)

Manifold Mounted Models

Threaded Connection Models

Operating Pressure psi (Max.)

## ● Tank Connection

When internally drained, the tank connection must be piped back to the reservoir through a surge free line so that there will be no pressure at this port.

## ● Drain Connection

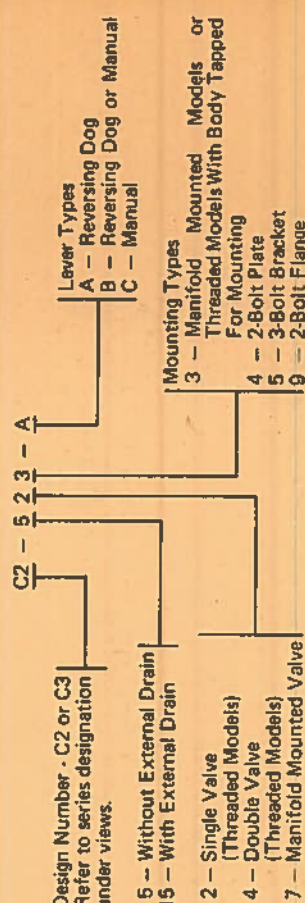
This connection must be piped back to the reservoir so that there will be no pressure at this port. Externally drained valves must be used when the tank connection is plugged or subject to pressure at any time during cycle.

Weight Lbs. (Approx.)

## Ordering Instructions

Select valves according to the typical model code shown below.

## Typical Model Code





GENERAL DATA  
IDEAL FOR USE IN HYDRAULIC CIRCUITS WHERE A SMALL TWO-WAY OR FOUR-WAY VALVE, PLUNGER TYPE PILOT INTERLOCK VALVE, OR PILOT CONTROL VALVE IS REQUIRED.

## TWO AND FOUR-WAY PILOT VALVES

**MANUAL KNOB OR MECHANICAL CAM ROLLER OPERATED  
FOR 1/4" PIPING**

MODEL NUMBERS		VALVE TYPE	DIRECTION OF OIL FLOW FOR VALVE POOL POSITION	
MAN. OPER. WITH KNOB.	MECH. OPER. WITH CAM ROLLER		EXTENDED	DEPRESSED
C-552 K		TWO-WAY	"p" → "1"	"p" → "1"
C-552 E			"2" BLOCKED	"1" BLOCKED
C-572 K		FOUR-WAY	"p" → "1"	"p" → "2"
C-572 E			"2" → "1"	"1" → "2"

**BODY CAN BE ASSEMBLED  
TO PLACE PIPING CONNECTIONS  
IN ANY ONE OF FOUR POSITIONS  
WITH RELATION TO MOUNTING  
SCREWS.**

25 VALVE SPOOL MOVEMENT  
(.16 SEAL C-572)  
(.12 SEAL C-552)

PLUNGER MAY BE ASSEMBLED  
SO THAT ROLLER WILL OPERATE  
IN A POSITION 90° FROM THAT  
SHOWN.

—SPRING RETURNS VALVE  
SPOOL TO EXTENDED  
POSITION SHOWN

CAM MOVES VALVE SPOOL TO DEPRESSED POSITION SHOWN—

TANK DISCHARGE  
CONNECTION  
1/4" NPTF PIPE THD.  
(SEE NOTE)

NO. 2 CONTROL  
CIRCUIT CONNECTION  
1/4" NPTF PIPE THD.

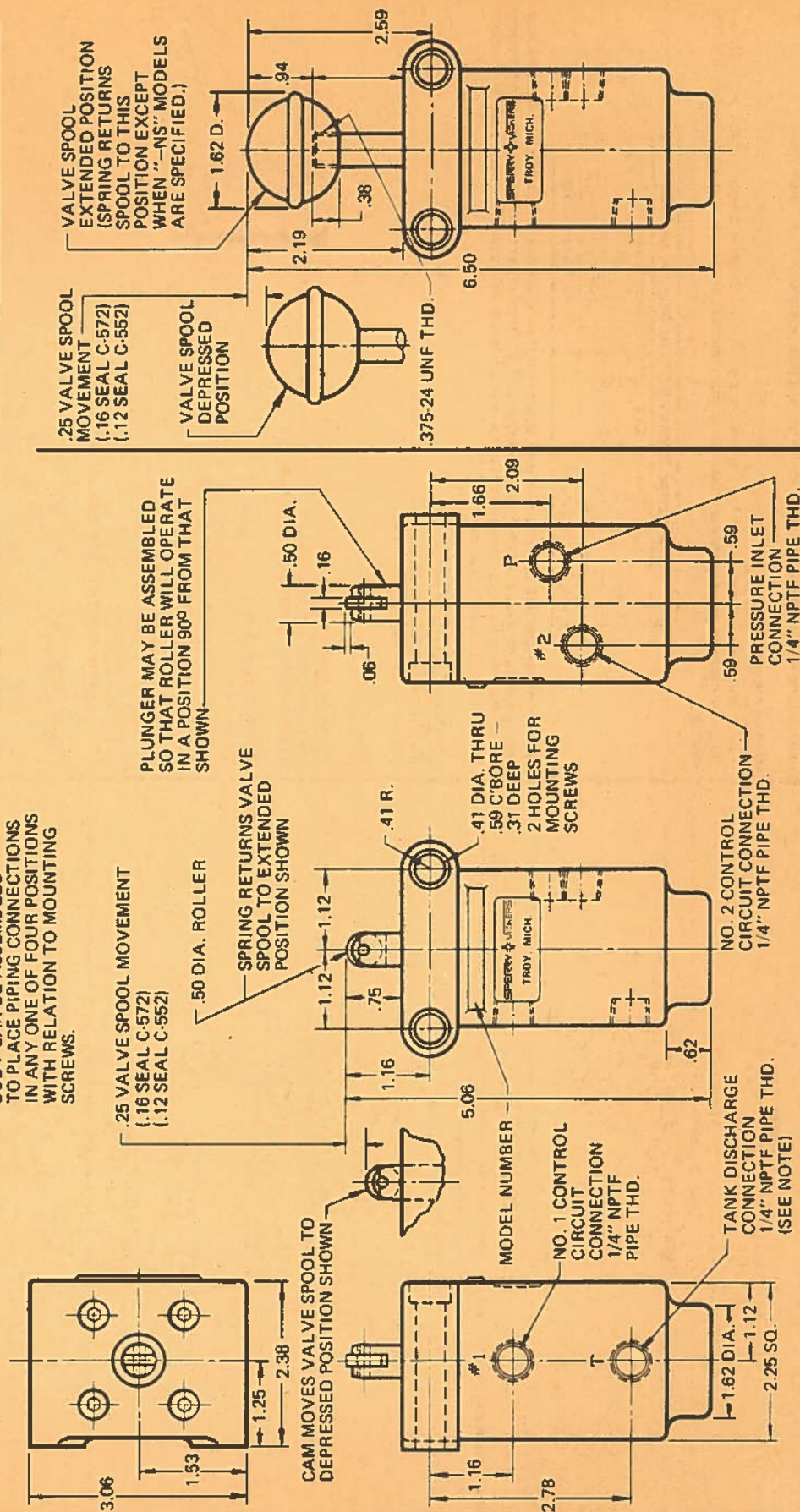
PRESSURE INLET  
CONNECTION —  
1/4" NPTF PIPE THD.

**MECHANICALLY OPERATED**

REVISÉ 3-1-77

MANUALLY OPERATED

514300





FLOW USGPM (MAXIMUM).....3  
 TANK OR DRAIN CONNECTION  
 MUST BE PIPED DIRECTLY TO TANK THRU A SURGE FREE LINE SO THERE WILL BE NO  
 BACK PRESSURE AT THIS PORT.  
 PRESSURE PSI (MAXIMUM).....2000  
 WEIGHT LB. (APPROX.).....5

**MECHANICAL OPERATION**  
 VALVE IS USUALLY OPERATED BY A CAM. MAXIMUM RECOMMENDED CAM ANGLE IS  
 35°. VALVE PLUNGER IS DERESSED AGAINST A MAXIMUM SPRING LOAD OF 30 LBS.  
 THIS LOAD BEING INDEPENDENT OF HYDRAULIC PRESSURE.

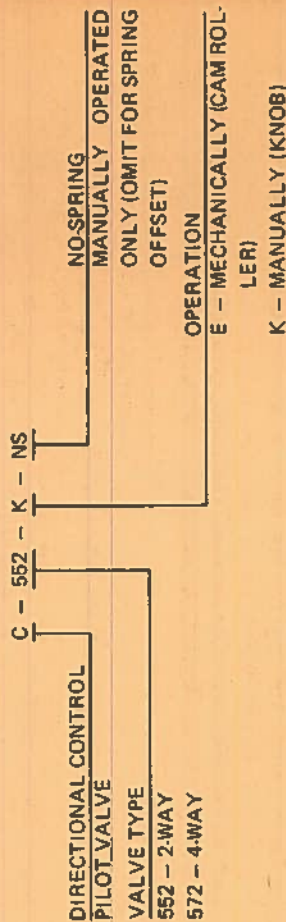
**MANUAL OPERATION**  
 SPRING OFFSET VALVES ARE SPRING POSITIONED UNLESS PLUNGER IS ACTUATED.  
 NO-SPRING VALVES MAINTAIN THE SPOOL POSITION LAST SELECTED. MACHINE VIBRA-  
 TION, HEAT, IMPROPER CIRCUITRY AND EXTERNALLY INDUCED SHOCKS MAY CAUSE  
 NO-SPRING VALVES TO SHIFT PREMATURELY.

**MOUNTING POSITION**  
 THE MOUNTING POSITION OF SPRING-OFFSET MODELS IS UNRESTRICTED.

NO-SPRING VALVES MUST BE INSTALLED WITH THE LONGITUDINAL AXIS HORIZONTAL  
 FOR GOOD MACHINE RELIABILITY.

**LEAKAGE**  
 VALVE LEAKAGE WILL BE APPROXIMATELY 5 IN.<sup>3</sup> UNDER NORMAL OPERATING  
 CONDITIONS.

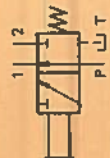
**MODEL CODE**



**STANDARD GRAPHICAL SYMBOLS FOR FLUID POWER DIAGRAMS**

**MANUALLY OPERATED**

SPRING OFFSET TWO-WAY



MODEL C-552-K

SPRING OFFSET FOUR-WAY



MODEL C-572-K

NO-SPRING TWO-WAY



MODEL C-552-K-NS

**MECHANICALLY OPERATED**

SPRING OFFSET TWO-WAY



MODEL C-552-E

SPRING OFFSET FOUR-WAY



MODEL C-572-E



**SPERRY VICKERS**  
TROY, MICHIGAN 48064

**DIRECTIONAL  
CONTROLS**

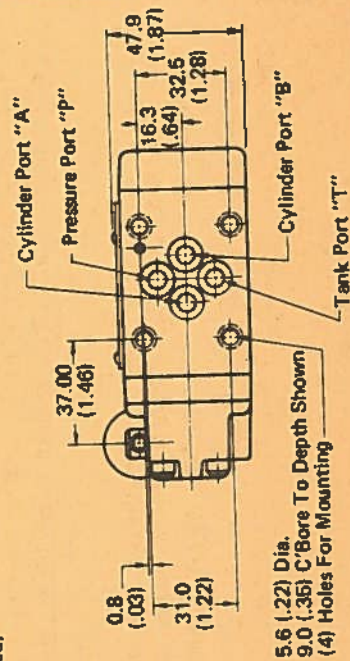
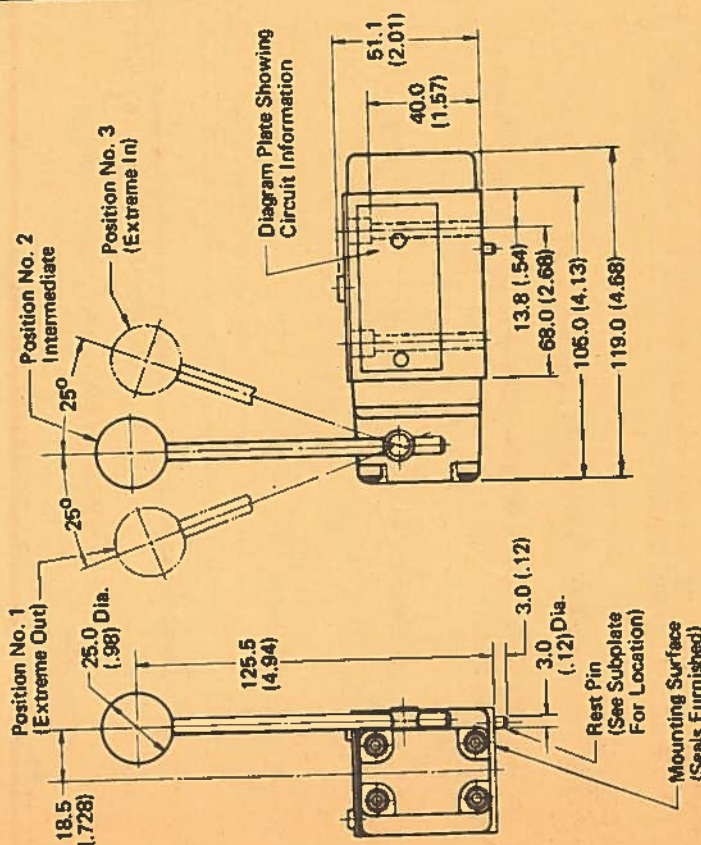
**FOUR-WAY  
VALVES**

**SPRING CENTERED  
NO-SPRING  
DETENTED  
SPRING OFFSET**

**TO 38 LITERS/MIN.  
(10 U.S. GPM)  
350 BAR (5000 PSI)**

**MANIFOLD OR  
SUBPLATE  
MOUNTING**

**DWG. NO  
514380**



**SPRING CENTERED LEVER OPERATED  
DG17V3-C-10**

**DIMENSIONS SHOWN  
MILLIMETERS (INCHES)**

# **SPERRY VICKERS** **MANUAL LEVER AND CAM/ROLLER OPERATED 4-WAY DIRECTIONAL VALVES**

**MODEL SERIES DG\*\*V-3-\*\*\*.10  
MANIFOLD OR SUBPLATE MOUNTING**

## **General Data**

The primary function of these four-way directional control valves, in a hydraulic circuit, is to direct flow. This in turn would determine the direction of movement of a fluid cylinder or the direction of rotation of a fluid motor.

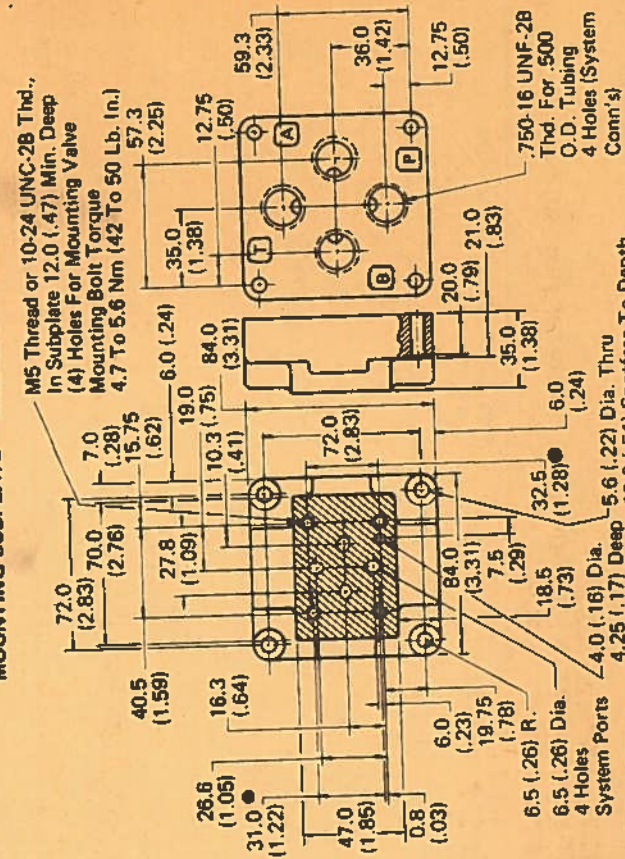
Port connections are made by mounting the valves on a subplate or manifold having mounting dimensions which conform to CETOP 4, 2-4-3P or NFPA DO1 pattern.

## **Performance**

Rated Flow Capacity..... 19 liter/min. (5 U.S. GPM)  
Maximum Flow..... 30.3 & 38 liter/min. (8 & 10 U.S. GPM) See Flow Rate Chart  
Maximum Operating Pressure..... 350 bar (5000 PSI)  
Maximum Tank Line Operating Pressure..... 6.9 bar (100 PSI)

Note: Tank return must be designed such that transient tank line pressure peaks do not exceed 6.9 bar (100 PSI). For tank return pressures in excess of 6.9 bar (100 PSI) lever movement must be assisted.

## **MOUNTING SUBPLATE — MODEL DGVM-3-10-S**



Note Mounting Bolt Spacing And Hole For Rest Pin To Insure Proper Mounting And Port Relationship



### General Operating Information

Maximum Cam Angle Recommended.....	35°
Cam Travel For Closed Center Dead Band of 90°30' (Either Side) For 35° Cam Angle.....	7.75mm (.305)

Note: Dead band should be taken into consideration when designing cam and system circuit. (See graphics for spring centered roller-operated valve.)



**Actuation Force (Approx.) Under Rated Conditions (See Note (a) On Front Page)**

DG17V.....	1.36 Kg (3.0 Lbs.)
DG20V.....	3.40 Kg (7.5 Lbs.)

Note: Manual lever and roller operators must be released from their actuated positions without any restrictions to spring return.

## Filtration

**To ensure sustained efficiency and maximum trouble free life, initial and continuous filtration of the system fluid to 35 microns absolute or less is essential.**

 Full Flow  
 Restricted Flow

Spool Type	Direction of Oil Flow For Manual or Roller Lever Position		
	No. 2 Intermediate	No. 3 Extreme In	No. 1 Extreme Out
"0"	Pr., Cyl. A & Cyl. B → Tank		
"2"	Pr., Cyl. A & Cyl. B Blocked	Pr. → Cyl. A Cyl. B → Tank	Pr. → Cyl. B Cyl. A → Tank
"6"	Pr. Blocked Cyl. A & Cyl. B → T		
"33"	Pr. Blocked Cyl. A & Cyl. B → T		

### Flow Ratings

Flow Rating liters/min. (U.S. GPM)			
Valve Type	Spool Type	Recommended Flow Capacity	Maximum Flow liters/min. U.S. GPM
Spring Centered	0, 2, 6	19 liters/min. (5 U.S. GPM)	38
Spring Centered	33		30.3
Spring Offset	0, 2, 6		38
Spring Offset	33		30.3

### Mounting Positions

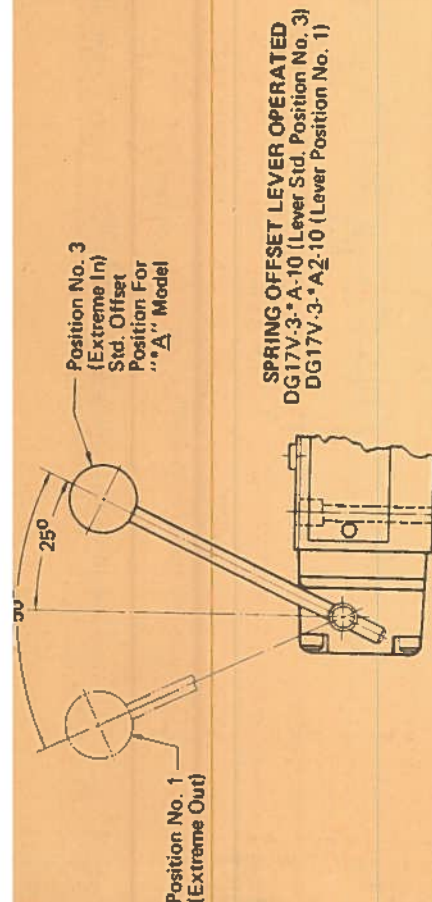
**Mounting position of spring offset and spring centered models is unrestricted. No-spring detented valves must be installed with longitudinal axis horizontal for good machine reliability.**

**Note:** Surges of oil in a common tank line serving these and other valves can be of sufficient magnitude to cause inadvertent shifting of these valves. This is particularly critical in the no spring detented type valves. Separate tank lines or a vented manifold with a continuous downward path to the tank is necessary.

**Note:** Any sliding spool valve, if held shifted under pressure for long periods of time, may stick and not spring return due to fluid residue formation and therefore, should be cycled periodically to prevent this from happening.

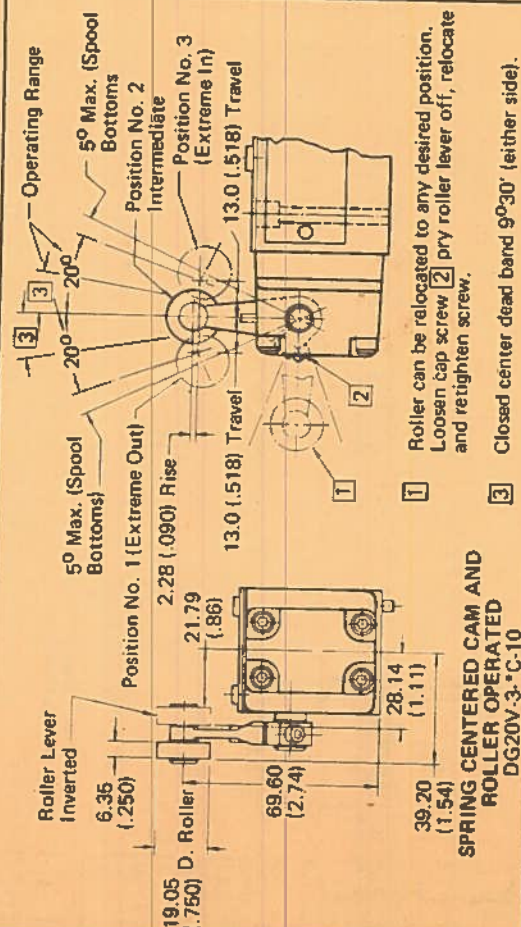
**note:** When used as other than a normal 4-way valve or other than is shown on typical graphical symbol chart consult your local Sperry Vickers representative.

514380-1



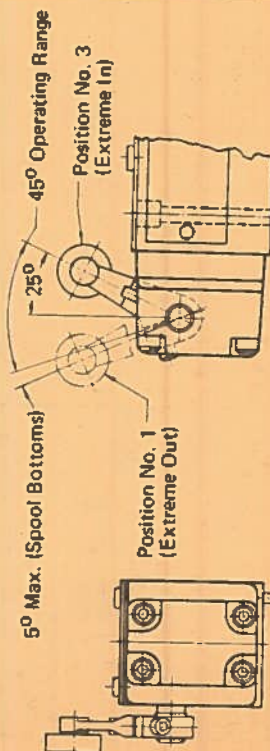
**SPRING OFFSET LEVER OPERATED**

DG17V-3-A-10 (Lever Std. Position No. 3)  
 DG17V-3-A2-10 (Lever Position No. 1)



**SPRING CENTERED CAM AND  
ROLLER OPERATED  
DG20V-3-C-10**

- 1 Roller can be relocated to any desired position. Loosen cap screw 2 pry roller lever off, relocate and retighten screw.
- 3 Closed center dead band 9°30' (either side).



**SPRING OFFSET CAM AND ROLLER OPERATED**

DG20V-3-A-10 (Roller Position No. 3)  
DG20V-3-A2-10 (Roller Position No. 1)



Pressure Drop Chart — bar (PSI)

Spool Type	Center Position "C" Models	Description	Flow Path				Center Condition P to T
			P to A or B	B to T	P to B	A to T	
0		Open Center All Ports	1.8 (26)	1.8 (26)	1.8 (26)	1.8 (26)	2.0 (29)
2		Closed Center All Ports	2.1 (31)	2.1 (31)	2.1 (31)	2.1 (31)	
6		Closed Center P Only	3.1 (45)	1.4 (20)	3.1 (45)	1.4 (20)	A or B to T 3.2 (46)
33		Closed Center Bleed A & B	2.1 (31)	2.0 (29)	2.1 (31)	2.0 (29)	

Figures in pressure drop chart give approximate pressure drops ( $\Delta P$ ) when passing 19 litre (5 GPM) flow (Q) of 20.5 cSt (100 SUS) fluids having .87 specific gravity.

For any other flow rate (Q<sub>1</sub>) the pressure drop ( $\Delta P_1$ ) will be approximately:

$$\Delta P_1 = \Delta P (Q_1/Q)^2$$

For any other viscosity(s) the pressure drop ( $\Delta P$ ) will change as follows:

Other Viscosity(s) cSt (SUS)	14 (75)	32 (150)	43 (200)	54 (250)	65 (300)	76 (350)	86 (400)
% of $\Delta P$ (Approx.)	93	111	119	126	132	137	141

For any other specific gravity ( $G_1$ ) the pressure drop ( $\Delta P_1$ ) will be approximately:

$$\Delta P_1 = \Delta P (G_1/G)$$

Specific gravity of fluid may be obtained from its producer. The value is higher for the fire resistant fluids.

SPRING CENTERED	SPRING CENTERED	SPRING CENTERED
SPPOOL TYPE 0	SPPOOL TYPE 33	SPPOOL TYPE 6
SPRING OFFSET		
SPRING CENTERED	STANDARD "A" OR "A2" LEFT HAND	"A" LEFT HAND OR "A2" STANDARD
SPPOOL TYPE 2	SPPOOL TYPES 0, 2, 6, 33	SPPOOL TYPES 0, 2, 6, 33

## Fluids and Seals

Viton seals are standard and suitable for use with phosphate ester type fluids or its blends, water glycol, water-in-oil emulsion fluids and petroleum oil. Refer to data sheet I-286-S for hydraulic fluid and temperature recommendations.

## Bolt Kits

Valves, subplate and mounting bolts must be ordered separately.

Example: One (1) DG17V-3-2C-10 Valve  
One (1) DGVM-3-10-S Subplate  
One (1) BKDG3-698 Bolt Kit (inch) or  
One (1) BKDG3-699M Bolt Kit (metric)

## Mounting Face Information

Mounting face must be flat (see shaded area on subplate drawing) within 0.013mm (.0005) and smooth within 1.1 micrometer (45 microinch). Mounting bolts when provided by customer, should be grade 12.9 (SAE grade 7) or better.

## Weights (Approx.)

DG17V-3-\*\*\*-10 ..... 1.55 Kg (3.4 Lbs.)  
DG20V-3-\*\*\*-10 ..... 1.50 Kg (3.3 Lbs.)

## Model Code

DG \*\* V - 3 - \* - \* - \* - 10 - LH

Directional Control  
Manifold or Subplate  
Mounting Sliding  
Spool 4-Way Flow  
Direction

Operating Method  
"17" — Manual Lever  
"20" — Roller Lever

Rated Pressure  
350 bar (5000 PSI)

CETOP 3 Interface NFPA-DO1

Type of Spool  
0, 2, 6 & 33 Available

Left Hand — Lever or Roller  
Located on "B" Port End  
Omit for Std. Models Shown  
(Lever on "A" Port End)

Design Number

"2" — Lever or Roller Spring  
Offset to Position No. 1  
Omit for Std. Position No. 3  
and Spring Centered Models

Spool Spring Arrangement  
"A" — Spring Offset  
"C" — Spring Centered  
"N" — No-Spring Detented

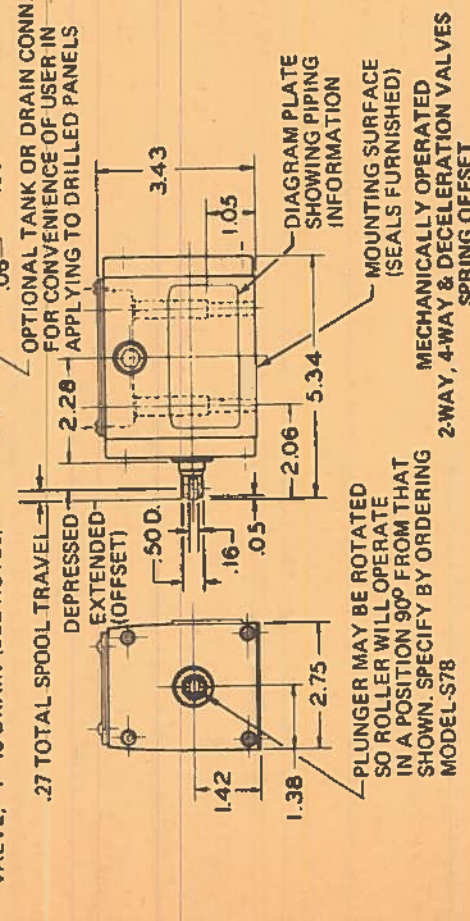
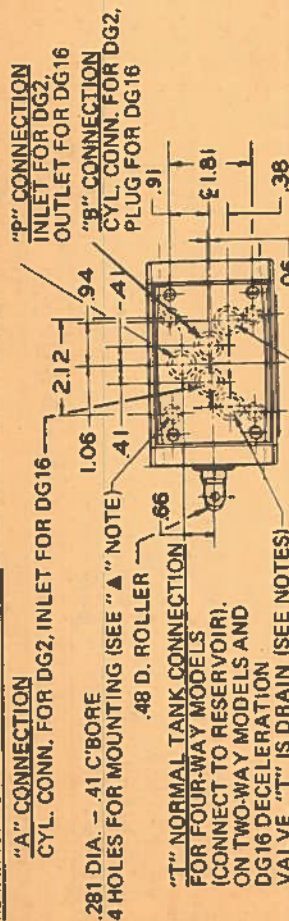


GENERAL DATA

THE DG16 DECELERATION VALVE PROVIDES AN IDEAL METHOD OF HYDRAULICALLY CONTROLLING DECELERATION THROUGH MECHANICAL ACTUATION. AN OUTSTANDING FEATURE OF THIS VALVE IS ITS SMOOTH DECELERATION CAPABILITY FOR LOW FLOWS.

THE DG2 TWO AND FOUR-WAY DIRECTIONAL VALVES MAY BE USED FOR A WIDE RANGE OF APPLICATIONS WHERE MECHANICAL ACTUATION IS PREFERRED.

MAXIMUM OPERATING PRESSURE..... 3000 PSI



SPERRY-VICKERS  
TROY, MICHIGAN 48064

TWO-WAY, FOUR-WAY &  
DECELERATION VALVES

MECHANICALLY  
OPERATED

3/8" OR 1/2"  
PIPING

MANIFOLD OR  
SUBPLATE  
MOUNTING

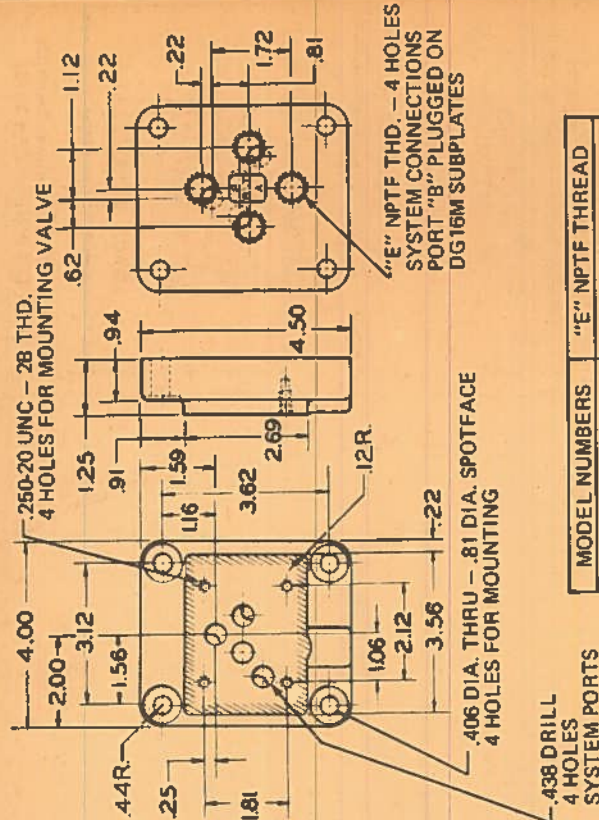
DWG. NO.  
514400A

SPERRY-VICKERS

DECELERATION AND TWO &  
FOUR-WAY DIRECTIONAL VALVES

MECHANICALLY OPERATED - MANIFOLD OR SUBPLATE MOUNTING  
FOR 3/8" OR 1/2" PIPING

MOUNTING SUBPLATES



MODEL NUMBERS	"E" NPTF THREAD
DGSM-01X-10	3/8
DG16M-01X-10	1/2
DGSM-01Y-10	
DG16M-01Y-10	

MOUNTING SUBPLATES AND BOLT KITS

VALVES, SUBPLATES AND MOUNTING BOLTS MUST BE ORDERED SEPARATELY.

EXAMPLE: ONE (1) DG2S4-012A-51 VALVE  
ONE (1) DGSM-01X-10 SUBPLATE  
ONE (1) BKDG01-633 BOLT KIT

"A" MAXIMUM RECOMMENDED MOUNTING  
BOLT TORQUE..... 112 lbf in

SIDE CONNECTION SUBPLATES ARE ALSO AVAILABLE WITH 3/8" AND 1/2" PIPE THREADS. SEE DRAWING 522600.

WHEN SUBPLATE IS NOT USED, A MACHINED PAD (AS INDICATED BY SUBPLATE SHADED AREA) MUST BE PROVIDED FOR MOUNTING; PAD MUST BE FLAT WITHIN .0006 INCH AND SMOOTH WITHIN 63 MICROINCH. MOUNTING BOLTS, WHEN PROVIDED BY CUSTOMER, SHOULD BE GRADE 7, OR BETTER.

514400A

MODEL NUMBERS		MAX. FLOW - GPM	ACTUATION FORCE (UNDER NO-FLOW CONDITIONS) APPROX. LBS. MAX.	VALVE TYPE	DIRECTION OF OIL FLOW FOR VALVE SPOOL POSITION		WEIGHT LB. APPROX. (ALL MODELS)
MECHANICAL DIRECTIONAL	MECHANICAL DECLARATION				EX-TENDED	DE-PRESSED	
DG2S2-012A-51		12	8	TWO-WAY	"P" -> "A"	"P" -> "B"	8
DG2S4-012A-51		20	20	FOUR-WAY	"P" -> "A"	"P" -> "B"	
	DG16S2-010A-51	12	8	DECEL.	"A" -> "P"	"A" -> "B"	

→ FULL FLOW

REVISED 12-1-78



# GENERAL OPERATING INFORMATION

MAXIMUM CAM ANGLE RECOMMENDED..... 35°

TANK OR DRAIN CONNECTION

TANK CONNECTION MUST BE PIPED DIRECTLY TO TANK THRU A SURGE FREE LINE SO THERE WILL BE NO BACK PRESSURE AT THIS PORT.

## MOUNTING POSITION

VALVES ARE SPRING OFFSET TYPE - NO RESTRICTION AS TO MOUNTING POSITION. PRESSURE DROP

PSI PRESSURE DROP AT 8 GPM						
MODEL NUMBER	VALVE TYPE	P TO A	B TO T	P TO B	A TO T	A TO P
DG2S2-012A-51	TWO-WAY	20	20	20	20	26
DG2S4-012A-51	FOUR-WAY	20	23	20	20	26
DG16S2-010A-51	DECELERATION					50

● FULL OPEN POSITION

1. FIGURES IN THE PRESSURE DROP CHART GIVE APPROXIMATE PRESSURE DROPS (ΔP) WHEN PASSING 8 GPM FLOW (Q) OF 100 SUS FLUID(S) HAVING .865 SPECIFIC GRAVITY.

2. FOR ANY OTHER FLOW RATE (Q<sub>1</sub>), THE PRESSURE DROP (ΔP<sub>1</sub>) WILL BE APPROXIMATELY:

$$\Delta P_1 = \Delta P (Q_1/Q)^2$$

3. FOR ANY OTHER VISCOSITY(S), THE PRESSURE DROP (ΔP) WILL CHANGE AS FOLLOWS:

OTHER VISCOSITY(S)	75	150	200	250	300	350	400
% OF ΔP (APPROX.)	93	111	119	126	132	137	141

4. FOR ANY OTHER SPECIFIC GRAVITY (G<sub>1</sub>), THE PRESSURE DROP (ΔP<sub>1</sub>), WILL BE APPROXIMATELY:

$$\Delta P_1 = \Delta P (G_1/G)$$

● SPECIFIC GRAVITY OF FLUID MAY BE OBTAINED FROM ITS PRODUCER. THE VALUE IS HIGHER FOR FIRE-RESISTANT FLUIDS THAN FOR OIL.

FLUID FILTRATION RECOMMENDED..... 35 MICRON ABSOLUTE OR LESS FLUIDS AND SEALS

THE USE OF SYNTHETIC FIRE-RESISTANT FLUIDS REQUIRES A VALVE WITH SPECIAL SEALS. ADD PREFIX "F3" TO MODEL NUMBER WHEN PHOSPHATE ESTERS OR ITS BLENDS ARE TO BE USED. WATER GLYCOL, WATER-IN-OIL EMULSIONS AND PETROLEUM OIL MAY BE USED WITH STANDARD SEALS. REFER TO DATA SHEET 1-286'S FOR HYDRAULIC FLUID AND TEMPERATURE RECOMMENDATIONS.

NOTE: ANY SLIDING SPOOL VALVE, IF HELD SHIFTED UNDER PRESSURE FOR LONG PERIODS OF TIME, MAY STICK AND NOT SPRING RETURN DUE TO FLUID RESIDUE FORMATION AND, THEREFORE, SHOULD BE CYCLED PERIODICALLY TO PREVENT THIS FROM HAPPENING.

## MODEL CODE

F3 - D G S \* 01 \* A - 51 - LH

SPECIAL SEALS (OMIT IF NOT REQUIRED) SEE FLUIDS AND SEALS NOTE

DIRECTIONAL CONTROL

MOUNTING TYPE

MANIFOLD OR SUBPLATE

VALVE TYPE

2 - MECHANICALLY OPERATED

16 - NON-ADJUSTABLE DECELERATION

SLIDING SPOOL

FLOW DIRECTION

2 - TWO-WAY

4 - FOUR-WAY (NOT AVAILABLE ON DG16)

VALVE SIZE

01 - 3/8" OR 1/2" PIPING

DESIGN NUMBER

SUBJECT TO CHANGE. INSTALLATION DIMENSIONS REMAIN AS SHOWN FOR DESIGN NUMBERS 50 THRU 59.

SPOOL - SPRING ARRANGEMENT

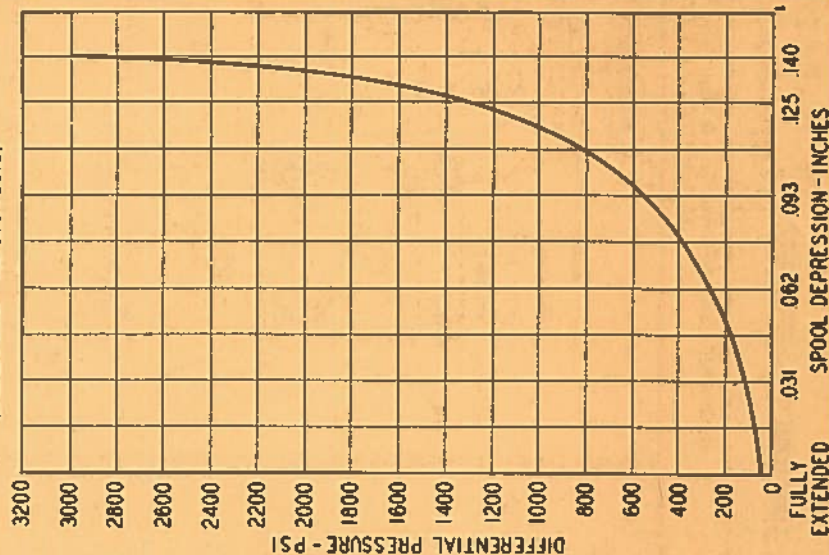
A - SPRING OFFSET

SPOOL TYPE

0 - OPEN CENTER (FULLY OPEN). AVAILABLE ON DG16 ONLY

2 - CLOSED CENTER

PRESSURE VS. SPOOL POSITION  
DECELERATION VALVE MODEL NO. DG16S2-010A-51  
(8 GPM FLOW - 100 SUS FLUID)



## STANDARD GRAPHICAL SYMBOLS FOR FLUID POWER DIAGRAMS

SPRING OFFSET - TWO-WAY (MECHANICALLY OPERATED)



MODEL DG2S2-012A-51

SPRING OFFSET - FOUR-WAY (MECHANICALLY OPERATED)



MODEL DG2S4-012A-51

SPRING OFFSET - DECELERATION (MECHANICALLY OPERATED)



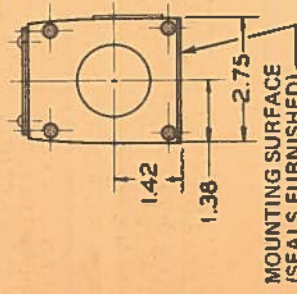
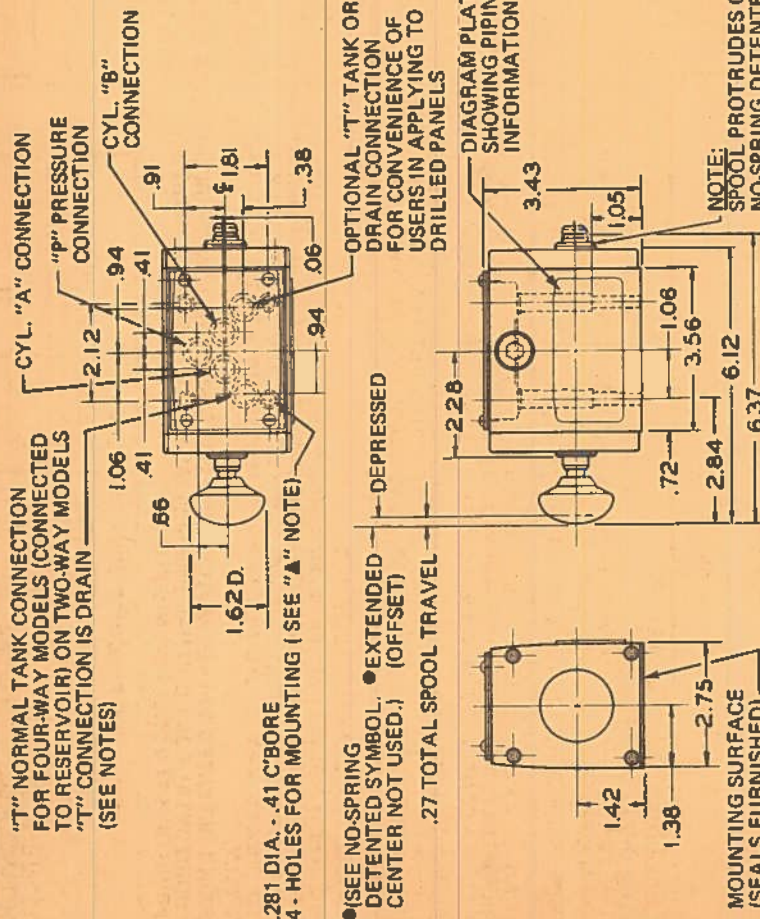
MODEL DG16S2-010A-51



# GENERAL DATA

THE DGT AND DG17 VALVES ARE IDEALLY SUITED FOR APPLICATIONS REQUIRING A MANUALLY OPERATED, TWO AND FOUR-WAY DIRECTIONAL VALVE. THE TWO-WAY VALVES ARE AVAILABLE IN BOTH SPRING OFFSET AND NO-SPRING DETENTED VERSIONS. THE FOUR-WAY VALVES ON THIS DRAWING ARE SPRING OFFSET ONLY. SEE DRAWING 514800 FOR SPRING CENTERED AND NO-SPRING DETENTED FOUR-WAY VALVES.

MAXIMUM OPERATING PRESSURE, ..... 3000 PSI

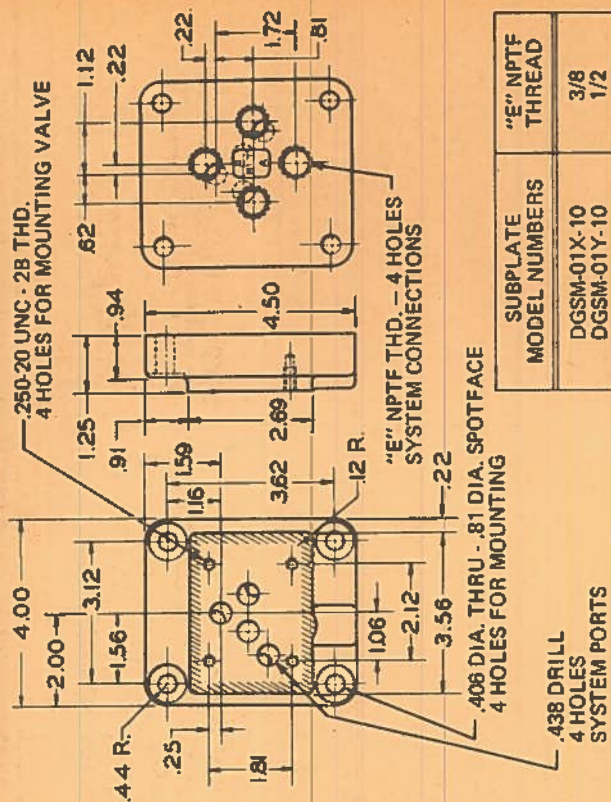


# TWO AND FOUR-WAY DIRECTIONAL VALVES



SPRING OFFSET AND NO-SPRING DETENTED  
MANUAL KNOB AND LEVER OPERATED  
MANIFOLD OR SUBPLATE MOUNTING  
3/8" OR 1/2" PIPING

## MOUNTING SUBPLATES



SUBPLATE MODEL NUMBERS	"E" NPTF THREAD
DGSM-01X-10	3/8
DGSM-01Y-10	1/2

SUBPLATES AND BOLT KITS  
VALVES, SUBPLATES AND MOUNTING BOLTS  
MUST BE ORDERED SEPARATELY.

EXAMPLE: ONE (1) DG17S4-012A-50 VALVE  
ONE (1) DGSM-01X-10 SUBPLATE  
ONE (1) BKDG01-633 BOLT KIT

"A" MAXIMUM RECOMMENDED  
MOUNTING BOLT TORQUE, ..... 112 lbf in

SIDE CONNECTION SUBPLATES ARE ALSO  
AVAILABLE WITH 3/8" AND 1/2" PIPE THREADS.  
SEE DRAWING 522600.

WHEN SUBPLATE IS NOT USED, A MACHINED  
PAD (AS INDICATED BY SUBPLATE SHADED  
AREA) MUST BE PROVIDED FOR MOUNTING;  
PAD MUST BE FLAT WITHIN .0005 INCH AND  
SMOOTH WITHIN 63 MICROINCH. MOUNTING  
BOLTS, WHEN PROVIDED BY CUSTOMER,  
SHOULD BE SAE GRADE 7, OR BETTER.

MODEL NUMBERS		MAX. FLOW - GPM	ACTUATION FORCE (UNDER NO-FLOW CONDITIONS) LBS. APPROX.		VALVE TYPE	DIRECTION OF OIL FLOW FOR VALVE SPOOL POSITION		WEIGHT LB. APPROX. (ALL MODELS)
MAN. OPER. WITH KNOB	MAN. OPER. WITH LEVER	1000 PSI	3000 PSI			EX. TENDED	DE. PRESSED	SUB. PLATE
DG1S2-012N-50		20	20	3	TWO-WAY	"p" → "A"	"p" → "B"	
	DG17S2-012N-50	20	20	1		"B"	"A"	
DG1S2-012A-50		8	5	13		BLOCKED	BLOCKED	7
	DG17S2-012A-50	12	8	2		"p" → "A"	"p" → "B"	
DG1S4-012A-50		8	5	13	FOUR-WAY	"B" → "T"	"A" → "T"	4 1/2
	DG17S4-012A-50	20	20	2				

→ FULL FLOW

REVISED 12-1-78

514500

SPERRY VICKERS  
TROY, MICHIGAN 48064

TWO & FOUR-WAY  
VALVES

KNOB AND  
LEVER OPERATED

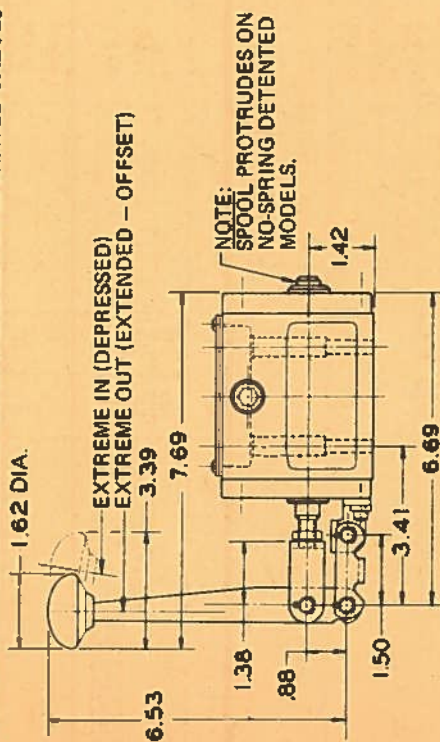
3/8" OR 1/2"  
PIPING

MANIFOLD OR  
SUBPLATE  
MOUNTING

DWG. NO.  
514500



# SPRING OFFSET & NO-SPRING DETENTED MANUAL LEVER OPERATED VALVES



## GENERAL OPERATING INFORMATION

TANK OR DRAIN CONNECTION MUST BE PIPED DIRECTLY TO TANK THRU A SURGE FREE LINE SO THERE WILL BE NO BACK PRESSURE AT THIS PORT.

**CAUTION:** SURGES OF OIL IN A COMMON TANK LINE SERVING THESE AND OTHER VALVES CAN BE OF SUFFICIENT MAGNITUDE TO CAUSE INADVERTENT SHIFTING OF THESE VALVES. THIS IS PARTICULARLY CRITICAL IN THE NO-SPRING DETENTED TYPE VALVES. SEPARATE TANK LINES OR A VENTED MANIFOLD WITH A CONTINUOUS DOWNWARD PATH TO TANK IS NECESSARY.

**NOTE:** ANY SLIDING SPOOL VALVE, IF HELD SHIFTED UNDER PRESSURE FOR LONG PERIODS OF TIME, MAY STICK AND NOT SPRING RETURN DUE TO FLUID RESIDUE FORMATION AND, THEREFORE, SHOULD BE CYCLED PERIODICALLY TO PREVENT THIS FROM HAPPENING.

## VALVE SHIFT AND MOUNTING POSITION

SPRING OFFSET VALVES ARE SPRING POSITIONED UNLESS LEVER IS ACTUATED. NO-SPRING DETENTED VALVES MAINTAIN THE SPOOL POSITION LAST SELECTED. MACHINE VIBRATION, HEAT, IMPROPER CIRCUITRY AND EXTERNALLY INDUCED SHOCKS MAY CAUSE NO-SPRING DETENTED VALVES TO SHIFT PREMATURELY.

NO-SPRING DETENTED VALVES MUST BE INSTALLED WITH THE LONGITUDINAL AXIS HORIZONTAL FOR GOOD MACHINE RELIABILITY. THE MOUNTING POSITION OF SPRING-OFFSET MODELS IS UNRESTRICTED.

PSI PRESSURE DROP AT 10 GPM					
MODEL NUMBER	VALVE TYPE	P TO A	B TO T	P TO B	A TO T
DG1S2-012N-50 DG1S2-012A-50 DG1S2-012N-50 DG1S2-012A-50	TWO-WAY	31		31	
DG1S4-012A-50 DG1S4-012A-50	FOUR-WAY	31	35	31	40

1. FIGURES IN THE PRESSURE DROP CHART GIVE APPROXIMATE PRESSURE DROPS ( $\Delta P$ ) WHEN PASSING 10 GPM FLOW (Q) OF 100 SUS FLUID(S), HAVING .865 SPECIFIC GRAVITY.

2. FOR ANY OTHER FLOW RATE ( $Q_1$ ), THE PRESSURE DROP ( $\Delta P_1$ ) WILL BE APPROXIMATELY:  
 $\Delta P_1 = \Delta P (Q_1/Q)^2$

3. FOR ANY OTHER VISCOSITY(S), THE PRESSURE DROP ( $\Delta P$ ) WILL CHANGE AS FOLLOWS:

OTHER VISCOSITY(S)	75	150	200	250	300	350	400
% OF $\Delta P$ (APPROX.)	93	111	119	126	132	137	141

4. FOR ANY OTHER SPECIFIC GRAVITY ( $G$ ), THE PRESSURE DROP ( $\Delta P_1$ ) WILL BE APPROXIMATELY:  
 $\Delta P_1 = \Delta P (G_1/G)$

\* SPECIFIC GRAVITY OF FLUID MAY BE OBTAINED FROM ITS PRODUCER. THE VALUE IS HIGHER FOR FIRE-RESISTANT FLUIDS THAN FOR OIL.

FLUID FILTRATION RECOMMENDED. . . . . 35 MICRON ABSOLUTE OR LESS

## FLUIDS AND SEALS

THE USE OF SYNTHETIC, FIRE-RESISTANT FLUIDS REQUIRES A VALVE WITH SPECIAL SEALS. ADD PREFIX "F3" TO MODEL NUMBER WHEN PHOSPHATE ESTERS OR ITS BLENDS ARE TO BE USED. WATER GLYCOL, WATER-IN-OIL EMULSIONS AND PETROLEUM OIL MAY BE USED WITH STANDARD SEALS. REFER TO DATA SHEET 1-286-S FOR HYDRAULIC FLUID AND TEMPERATURE RECOMMENDATIONS.

## MODEL CODE

F3 - DG \* S \* - 01 2 A - 50 - LH

SPECIAL SEALS (OMIT IF NOT REQUIRED) SEE FLUIDS AND SEALS NOTE

DIRECTIONAL CONTROL

MOUNTING MANIFOLD OR SUBPLATE

OPERATION 1 - MANUAL KNOB 17 - MANUAL LEVER

SLIDING SPOOL

VALVE TYPE 2 - TWO-WAY FLOW DIRECTION 4 - FOUR-WAY FLOW DIRECTION - SPRING OFFSET MODEL ONLY

SPOOL - SPRING ARRANGEMENT A - SPRING OFFSET N - NO-SPRING DETENTED

SPOOL TYPE 2 - CLOSED CENTER

VALVE SIZE 01 - 1/8"

LEFT HAND KNOB OR LEVER ON "B" SIDE. (REVERSE FLOW FROM "A" SIDE MODELS SHOWN)

DESIGN NUMBER SUBJECT TO CHANGE. INSTALLATION DIMENSIONS REMAIN AS SHOWN FOR DESIGN NUMBERS 50 THRU 58.

## STANDARD GRAPHICAL SYMBOLS FOR FLUID POWER DIAGRAMS

SPRING OFFSET TWO-WAY



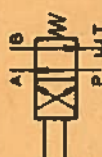
MODEL DG1S2-012A-50  
MODEL DG1S2-012A-50

NO-SPRING TWO-WAY DETENTED



MODEL DG1S2-012N-50  
MODEL DG1S2-012N-50

SPRING OFFSET FOUR-WAY

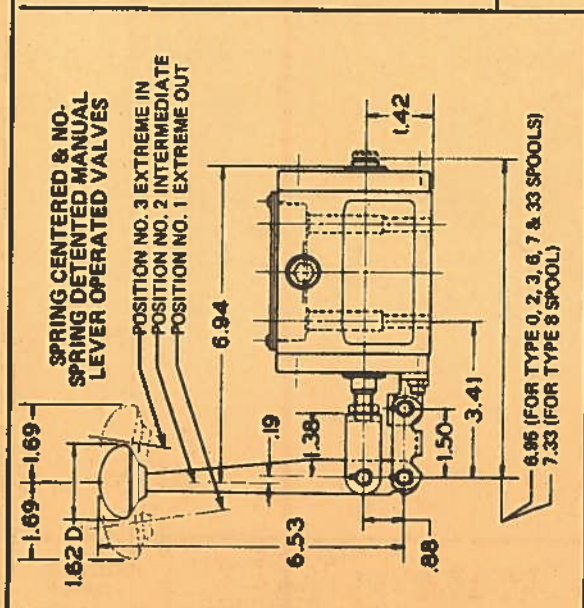


MODEL DG1S4-012A-50  
MODEL DG1S4-012A-50









MODEL NUMBERS		SPOOL TYPE	DIRECTION OF OIL FLOW FOR VALVE SPOOL POSITIONS		
MANUAL OPER. WITH KNOB	MANUAL OPER. WITH LEVER		WITH SPOOL IN CENTER POSITION NO. 2	POSITION NO. 1	POSITION NO. 3
DG1S4-010*-50	DG17S4-010*-50	"0" OPEN CENTER ALL PORTS	FULLY OPEN		
DG1S4-012*-50	DG17S4-012*-50	"2" CLOSED CENTER ALL PORTS	FULLY CLOSED		
DG1S4-013*-50	DG17S4-013*-50	"3" CLOSED CENTER "P" & "B"	"P" & "B" BLOCKED "A" → "T"	"P" → "A" "B" → "T"	"P" → "B" "A" → "T"
DG1S4-018*-50	DG17S4-018*-50	"6" CLOSED CENTER "P" ONLY	"P" BLOCKED "A" & "B" → "T"		
DG1S4-017*-50	DG17S4-017*-50	"7" OPEN CENTER "T" BLOCKED	"P" → "A" & "B" "T" → "T"		
DG1S4-018*-50	DG17S4-018*-50	"8" TANDEM OPEN CROSSOVER	"P" → "A" & "B" BLOCKED "T" → "T"	"P" → "B" "A" → "T"	"P" → "A" "B" → "T"
DG1S4-0133*-50	DG17S4-0133*-50	"33" CLOSED CENTER BLEED "A" & "B"	"P" BLOCKED "A" & "B" → "T" X	"P" → "A" "B" → "T"	"P" → "B" "A" → "T"

REFER TO DRAWING 514600 FOR 2-WAY NO-SPRING DETENTED VALVE INFORMATION.

→ FULL FLOW  
X RESTRICTED FLOW

FILTRATION (RECOMMENDED) ..... 35 MICRON ABSOLUTE OR LESS  
VALVE SHIFT AND MOUNTING POSITION  
SPRING CENTERED VALVES RETURN THE SPOOL TO CENTER POSITION WHEN THE LEVER OR KNOB CONTROL IS RELEASED.

NO-SPRING DETENTED VALVES WILL REMAIN IN THE LAST POSITION ATTAINED PROVIDED THERE IS NO SEVERE SHOCK, VIBRATION OR UNUSUAL PRESSURE TRANSIENTS.

NO-SPRING DETENTED VALVES MUST BE INSTALLED WITH THE LONGITUDINAL AXIS HORIZONTAL FOR GOOD MACHINE RELIABILITY. MOUNTING POSITION OF SPRING CENTERED MODELS IS UNRESTRICTED.

CAUTION: SURGES OF OIL IN A COMMON TANK LINE SERVING THESE AND OTHER VALVES CAN BE OF SUFFICIENT MAGNITUDE TO CAUSE INADVERTENT SHIFTING OF THESE VALVES. THIS IS PARTICULARLY CRITICAL IN THE NO-SPRING DETENTED TYPE VALVES. SEPARATE TANK LINES OR A VENTED MANIFOLD WITH A CONTINUOUS DOWNWARD PATH TO TANK IS NECESSARY.

NOTE: ANY SLIDING SPOOL VALVE, IF HELD SHIFTED UNDER PRESSURE FOR LONG PERIODS OF TIME, MAY STICK AND NOT SPRING RETURN DUE TO FLUID RESIDUE FORMATION AND, THEREFORE, SHOULD BE CYCLED PERIODICALLY TO PREVENT THIS FROM HAPPENING.

FLUIDS AND SEALS  
THE USE OF SYNTHETIC, FIRE-RESISTANT FLUIDS REQUIRES A VALVE WITH SPECIAL SEALS. ADD PREFIX "F3" TO MODEL NUMBER WHEN PHOSPHATE ESTERS OR ITS BLENDS ARE TO BE USED. WATER GLYCOL, WATER-IN-OIL EMULSIONS AND PETROLEUM OIL MAY BE USED WITH STANDARD SEALS. REFER TO DATA SHEET 1-286-S FOR HYDRAULIC FLUID AND TEMPERATURE RECOMMENDATIONS.

WEIGHT (LBS. APPROX.)  
DG1 - KNOB OPERATED ..... 7.5  
DG17 - LEVER OPERATED ..... 9.0

MODEL CODE  
F3 - DG \* S 4 - 01 \* - 50 - LH  
LEFT HAND KNOB OR LEVER ON "B" SIDE (REVERSE FLOW FROM "A" SIDE MODELS SHOWN)

SPECIAL SEALS (OMIT IF NOT REQUIRED) SEE FLUIDS AND SEALS NOTE

DIRECTIONAL CONTROL VALVE

MOUNTING TYPE  
MANIFOLD OR SUBPLATE

1 - MANUAL KNOB OPERATED  
17 - MANUAL LEVER OPERATED

SLIDING SPOOL

FOUR-WAY FLOW DIRECTION

VALVE SIZE

DESIGN NUMBER, SUBJECT TO CHANGE. INSTALLATION DIMENSIONS REMAIN AS SHOWN FOR DESIGNS 60 THRU 99.

SPOOL - SPRING ARRANGEMENT:  
C - SPRING CENTERED  
N - NO-SPRING DETENTED

SPOOL TYPES  
0, 2, 3, 6, 7, 8, 33 SEE MODEL NUMBER CHART

PSI PRESSURE DROP AT 10 GPM						
SPOOL TYPE	P TO A	B TO T	P TO B	A TO T	P TO T	P TO T CENT.
0	28	24	28	33	33	33
2	31	36	31	40		
3	31	36	31	33		
6	31	24	31	33		
7	28	33	28	40		
8	33	37	33	44		101
33	31	33	31	40		

1. FIGURES IN THE PRESSURE DROP CHART GIVE APPROXIMATE PRESSURE DROPS ( $\Delta P$ ) WHEN PASSING 10 GPM FLOW (Q) OF 100 SSU FLUID(S), HAVING .885 SPECIFIC GRAVITY.

2. FOR ANY OTHER FLOW RATE ( $Q_1$ ), THE PRESSURE DROP ( $\Delta P_1$ ) WILL BE APPROXIMATELY:  
 $\Delta P_1 = \Delta P (Q_1/Q)^2$

3. FOR ANY OTHER VISCOSITY(S), THE PRESSURE DROP ( $\Delta P$ ) WILL CHANGE AS FOLLOWS:

OTHER VISCOSITY(S)	75	150	200	250	300	350	400
% OF $\Delta P$ (APPROX.)	83	111	119	126	132	137	141

4. FOR ANY OTHER SPECIFIC GRAVITY ( $G_1$ ), THE PRESSURE DROP ( $\Delta P_1$ ) WILL BE APPROXIMATELY:  
 $\Delta P_1 = \Delta P (G_1/G)$

\*SPECIFIC GRAVITY OF FLUID MAY BE OBTAINED FROM ITS PRODUCER. THE VALUE IS HIGHER FOR FIRE-RESISTANT FLUIDS THAN FOR OIL.

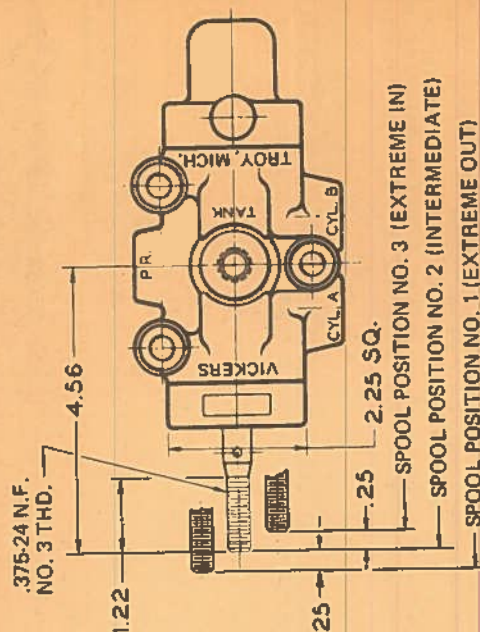
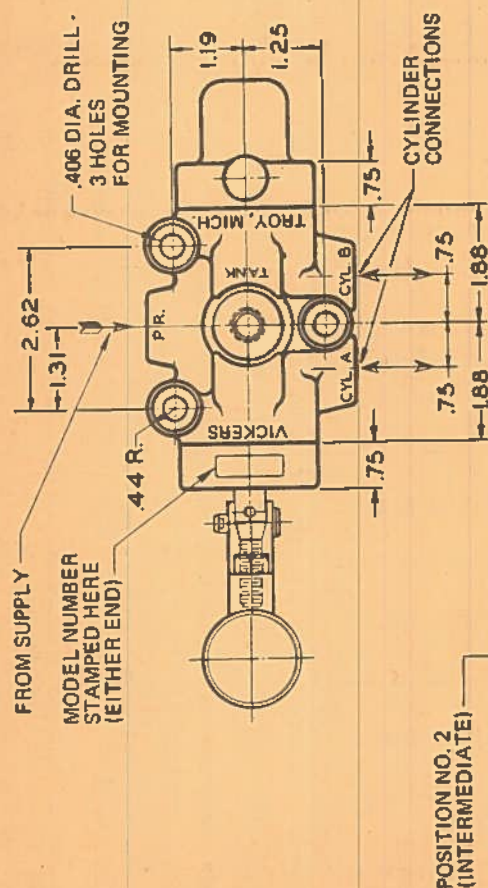
ACTION FORCE (LBS. APPROX.) UNDER NO-FLOW CONDITIONS

DG1 NO-SPRING DETENTED	8
DG1 SPRING CENTERED	11
DG17 NO-SPRING DETENTED	1
DG17 SPRING CENTERED	1-1/2

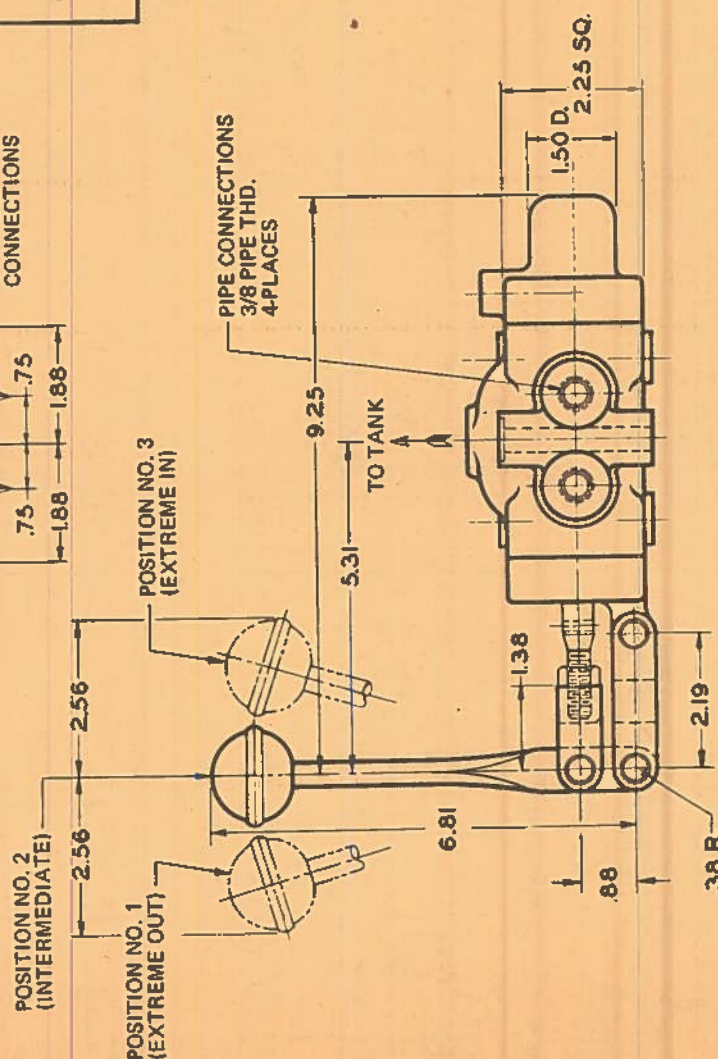


## VICKERS

**MODEL SERIES C-47\*.\***  
**LEVER OR STEM OPERATED**  
**THREADED CONNECTIONS**



**STEM OPERATED**



LEVER OPERATED

VICKERS DIVISION OF SPERRY RAND CORPORATION TROY, MICHIGAN 48064	DIRECTIONAL CONTROLS	FOUR-WAY VALVES	LEVER OR STEM OPERATED	3/8 PIPE SIZE	THREADED CONNECTIONS	DWG. NO. 515500
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# FOUR WAY DIRECTIONAL VALVES

MODEL SERIES C-47\*  
LEVER OR STEM OPERATED  
THREADED CONNECTIONS

## GENERAL DATA

THESE VALVES ARE IDEALLY SUITED FOR APPLICATIONS REQUIRING A MANUALLY LEVER OR MECHANICALLY STEM OPERATED FOUR-WAY DIRECTIONAL VALVE.

MODEL NUMBERS LISTED IN THE FIRST COLUMN OF THE TABLE MUST BE USED TO SPECIFY CORRECT TYPE OF FOUR-WAY VALVE REQUIRED.

MODEL NUMBERS	TYPE	DIRECTION OF OIL FLOW FOR VALVE SPOOL POSITION		
		NO. 2 INTERMEDIATE	NO. 1 EXTREME OUT	NO. 3 EXTREME IN
C-478-C	SPRING CENTERED			
C-478-C-A	SPRING OFFSET TO POSITION NO. 1	CYL. "A" CYL. "B" & PRESSURE OPEN TO TANK		
C-478-C-NS	NO SPRING (DETENTS)			
C-478-C-S1	SPRING CENTERED		CYL. "A" OPEN TO PRESSURE	CYL. "B" OPEN TO PRESSURE
C-478-C-NS-S1	NO SPRING (DETENTS)	"2" CENTER	PR. OPEN TO TANK THRU CYL. "A" CYL. "B" BLOCKED	CYL. "A" OPEN TO TANK
C-476-C	SPRING CENTERED			
C-476-C-A	SPRING OFFSET TO POSITION NO. 1	CLOSED CENTER	CYL. "A" CYL. "B" & PRESSURE BLOCKED	
C-476-C-NS	NO SPRING (DETENTS)			

SPRING CENTERED VALVES ARE EQUIPPED WITH AN INTERNAL SPRING FOR RETURNING THE SPOOL AND LEVER TO THE INTERMEDIATE POSITION FROM EITHER OF THE TWO EXTREME POSITIONS WHEN THE LEVER IS RELEASED.

SPRING OFFSET TYPE VALVES ARE EQUIPPED WITH AN INTERNAL SPRING FOR RETURNING THE SPOOL AND LEVER TO THE EXTREME POSITION AS INDICATED IN THE TABLE, WHEN LEVER IS RELEASED.

"NO-SPRING" TYPE VALVES ARE PROVIDED WITH DETENTS AT THE THREE SPOOL POSITIONS ALLOWING LEVER TO REMAIN IN THE SELECTED POSITION.

SPRING FORCE OF APPROXIMATELY 20 POUNDS IS REQUIRED TO OVERCOME "SPRING CENTERED" TYPE OF VALVES AND MOVE SPOOL FROM POSITION NO. 2 TO POSITION NO. 1 OR NO. 3. APPROXIMATELY 30 POUNDS OF FORCE IS REQUIRED TO OVERCOME "SPRING OFFSET" TYPE OF VALVES TO MOVE SPOOL FROM ONE EXTREME POSITION TO THE OTHER.

OPEN CENTER TYPE VALVES SHOULD BE USED WHEN IT IS NECESSARY TO ALLOW SYSTEM SUPPLY PRESSURE TO DROP OFF WHILE VALVE SPOOL IS AT THE INTERMEDIATE POSITION, PROVIDED IT IS UNNECESSARY TO BLOCK OFF EITHER CYLINDER CONNECTION AT THIS POSITION.

"Z" CENTER TYPES ALSO ALLOW SUPPLY SYSTEM PRESSURE TO DROP OFF AT THE INTERMEDIATE VALVE SPOOL POSITION, AND SHOULD BE USED WHEN IT IS NECESSARY TO BLOCK CYLINDER "B" CONNECTION AT THIS POSITION.

CLOSED CENTER TYPES SHOULD BE USED WHEN IT IS NECESSARY TO MAINTAIN PRESSURE IN THE SUPPLY SYSTEM WHILE VALVE SPOOL IS AT INTERMEDIATE POSITION. BOTH CYLINDER CONNECTIONS ARE BLOCKED AT INTERMEDIATE POSITION. UNLOADING OF PRESSURE SYSTEM BY MECHANICALLY PULLING VALVE SPOOL TO CENTER WITH MOVEMENT OF THE CONTROLLED CYLINDER ROD CAN ONLY BE ACCOMPLISHED WITH "OPEN CENTER" TYPE VALVES. SPECIAL CIRCUITS TO ACCOMPLISH THIS USING "Z" CENTER VALVE TYPES ARE AVAILABLE UPON REQUEST FOR PRESSES AND SIMILAR APPLICATIONS.

LEFT-HAND ASSEMBLY CAN BE SUPPLIED AT SMALL ADDITIONAL COST. THIS PROVIDES FOR HAND LEVER AT OPPOSITE END OF MAIN VALVE BODY FROM POSITION SHOWN. INSTALLATION IS OFTEN SIMPLIFIED BY THIS ARRANGEMENT. SUFFIX "LH" MUST BE ADDED TO MODEL NUMBER. (EXAMPLE: C-478-C-LH). CAUTION: DIRECTION OF FLOW IS REVERSED FOR NO. 1 AND NO. 3 SPOOL POSITIONS IN ALL LEFT-HAND MODELS.

BACK PRESSURE ON TANK OUTLET CONNECTION SHOULD NOT EXCEED..... 5 PSI

MAXIMUM CAPACITY..... 6 GPM

MAXIMUM OPERATING PRESSURE RECOMMENDED..... 2000 PSI

STEM OPERATED MODELS MAY BE ORDERED BY OMITTING LETTER SUFFIX "C" FROM MODEL NUMBER. EXAMPLE: C-478 (SPRING CENTERED, STEM OPERATED).

WEIGHT LBS. (APPROX.)

LEVER OPERATED..... 9

STEM OPERATED..... 8

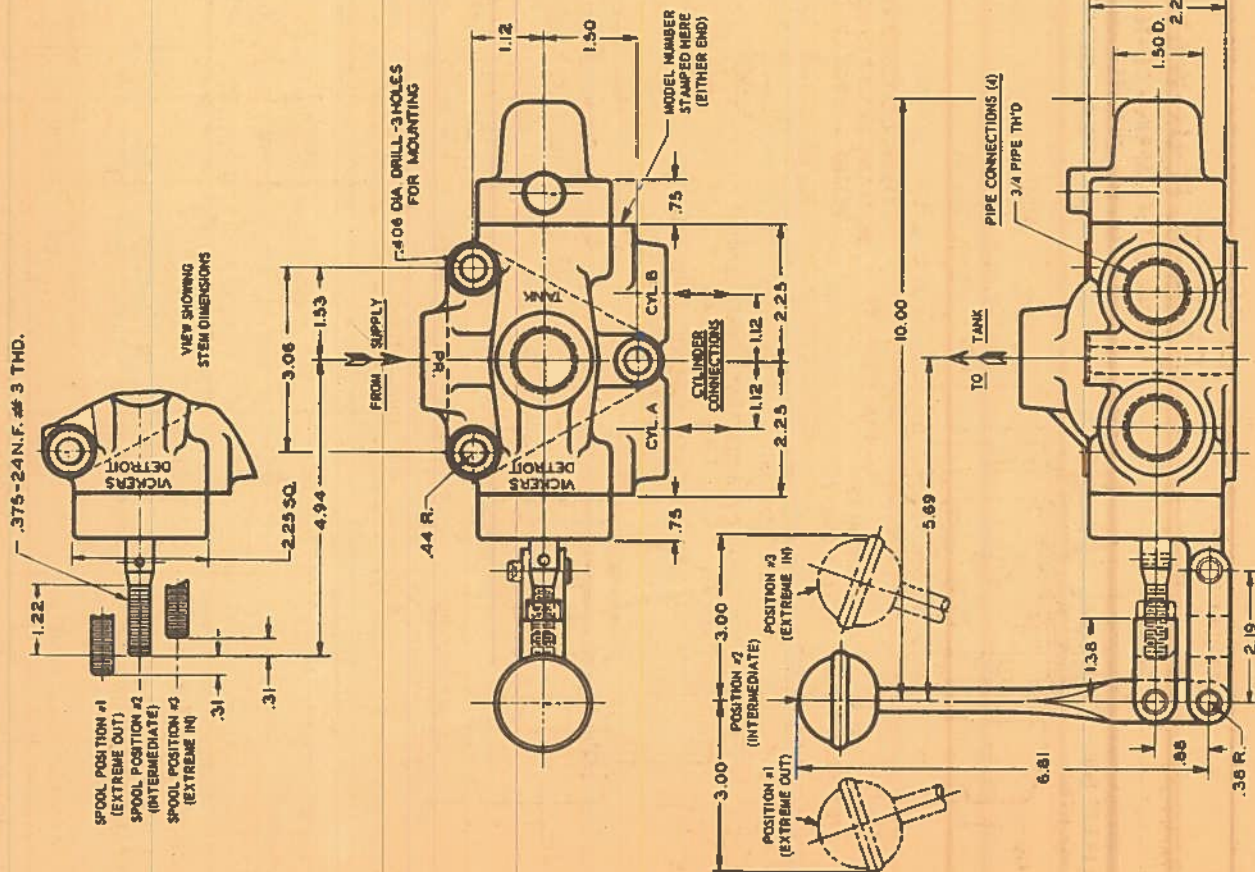
STANDARD GRAPHICAL SYMBOL FOR FLUID POWER DIAGRAMS



SPRING CENTERED



# **VICKERS. FOUR-WAY VALVES** **LEVER AND STEM OPERATED** **THREADED CONNECTIONS**



DIRECTIONAL CONTROLS | FOUR-WAY VALVES | LEVER & STEM OPERATED | 3/4 PIPE SIZE | THREADED CONNECTIONS | INST. DRWG. I-3288

MODEL NUMBERS LISTED IN THE FIRST COLUMN OF THE TABLE MUST BE USED TO SPECIFY CORRECT TYPE OF FOUR-WAY VALVE REQUIRED.

SPRING CENTERED VALVES ARE EQUIPPED WITH AN INTERNAL SPRING FOR RETURNING THE SPOOL AND LEVER TO THE INTERMEDIATE POSITION FROM EITHER OF THE TWO EXTREME POSITIONS WHEN THE LEVER IS RELEASED.

SPRING OFFSET TYPE VALVES ARE EQUIPPED WITH AN INTERNAL SPRING FOR RETURNING THE SPOOL AND LEVER TO THE EXTREME POSITION, AS INDICATED IN THE TABLE, WHEN LEVER IS RELEASED. "NO-SPRING" TYPE VALVES ARE PROVIDED WITH DETENTS AT THE THREE SPOOL POSITIONS ALLOWING LEVER TO REMAIN IN THE SELECTED POSITION.

SPRING FORCE OF APPROXIMATELY 40 POUNDS IS REQUIRED TO OVERCOME "SPRING CENTERED" TYPE OF VALVES AND MOVE SPOOL FROM POSITION #2 TO POSITION #1 OR #3. APPROXIMATELY 60 POUNDS OF FORCE IS REQUIRED TO OVERCOME "SPRING OFFSET" TYPE OF VALVES TO MOVE SPOOL FROM ONE EXTREME POSITION TO THE OTHER.

OPEN CENTER TYPE VALVES SHOULD BE USED WHEN IT IS NECESSARY TO ALLOW SYSTEM SUPPLY PRESSURE TO DROP OFF WHILE VALVE SPOOL IS AT THE INTERMEDIATE POSITION; PROVIDED IT IS UNNECESSARY TO BLOCK OFF EITHER CYLINDER CONNECTION AT THIS POSITION.

"Z" CENTER TYPES ALSO ALLOW SUPPLY SYSTEM PRESSURE TO DROP OFF AT THE INTERMEDIATE VALVE SPOOL POSITION, AND SHOULD BE USED WHEN IT IS NECESSARY TO BLOCK CYLINDER "B" CONNECTION AT THIS POSITION.

CLOSED CENTER TYPES SHOULD BE USED WHEN IT IS NECESSARY TO MAINTAIN PRESSURE IN THE SUPPLY SYSTEM WHILE VALVE SPOOL IS AT INTERMEDIATE POSITION. BOTH CYLINDER CONNECTIONS ARE BLOCKED AT INTERMEDIATE POSITION.

UNLOADING OF PRESSURE SYSTEM BY MECHANICALLY PULLING VALVE SPOOL TO CENTER WITH MOVE-MENT OF THE CONTROLLED CYLINDER ROD CAN ONLY BE ACCOMPLISHED WITH "OPEN CENTER" TYPE VALVES SPECIAL CIRCUITS TO ACCOMPLISH THIS USING "Z" CENTER VALVE TYPES ARE AVAILABLE UPON REQUEST FOR PRESSES AND SIMILAR APPLICATIONS.

LEFT-HAND ASSEMBLY CAN BE SUPPLIED AT SMALL ADDITIONAL COST. THIS PROVIDES FOR HAND LEVER AT OPPOSITE END OF MAIN VALVE BODY FROM POSITION SHOWN. INSTALLATION IS OPTIMIZED BY THIS ARRANGEMENT SUFFIX "LH" MUST BE ADDED TO MODEL NUMBER. (EXAMPLE: C-430-C-LH). CAUTION: DIRECTION OF FLOW IS REVERSED FOR #1 AND #3 SPOOL POSITIONS IN ALL LEFT-HAND MODELS.

BACK PRESSURE ON TANK OUTLET CONNECTION SHOULD NOT EXCEED 5 PSI.

MAXIMUM CAPACITY 10 GPM

MAXIMUM RECOMMENDED OPERATING PRESSURE 2000 PSI

STEM OPERATED MODELS MAY BE ORDERED BY OMITTING LETTER SUFFIX "C" FROM MODEL NUMBER. EXAMPLE: C-430 (SPRING CENTERED, STEM OPERATED).

WEIGHT (APPROX.)

LEVER OPERATED 11 LBS.  
STEM OPERATED 10 LBS.

MODEL NUMBERS	TYPE	DIRECTION OF OIL FLOW FOR VALVE SPOOL POSITION		
		#2 INTERMEDIATE	#1 EXTREME OUT	#3 EXTREME IN
C-430-C	SPRING CENTERED	CYL "A" CYL "B" & PRESSURE OPEN TO TANK	CYL "A" OPEN TO PRESSURE	CYL "B" OPEN TO PRESSURE
C-430-C-A	SPRING OFFSET TO POSITION #1	"Z" CENTER	PR. OPEN TO TANK THRU CYL "A"	CYL "B" OPEN TO TANK
C-430-C-S	NO SPRING (DETENTS)	"Z" CENTER	CYL "A" CYL "B" & PRESSURE BLOCKED	CYL "A" CYL "B" & PRESSURE BLOCKED
C-430-C-LH	SPRING CENTERED	CLOSED CENTER	CYL "A" CYL "B" & PRESSURE BLOCKED	CYL "A" CYL "B" & PRESSURE BLOCKED
C-432-C	SPRING OFFSET TO POSITION #1	CLOSED CENTER	CYL "A" CYL "B" & PRESSURE BLOCKED	CYL "A" CYL "B" & PRESSURE BLOCKED
C-432-C-A	NO SPRING (DETENTS)	CLOSED CENTER	CYL "A" CYL "B" & PRESSURE BLOCKED	CYL "A" CYL "B" & PRESSURE BLOCKED
C-432-C-S	NO SPRING (DETENTS)	CLOSED CENTER	CYL "A" CYL "B" & PRESSURE BLOCKED	CYL "A" CYL "B" & PRESSURE BLOCKED

REVISED 11-5-62 R.W.S.

**VICKERS INCORPORATED**  
DIVISION OF SPERRY RAND CORPORATION  
ANN ARBOR, MICHIGAN, U.S.A.

INSTALLATION DRAWING

THIS DRAWING RELEASED

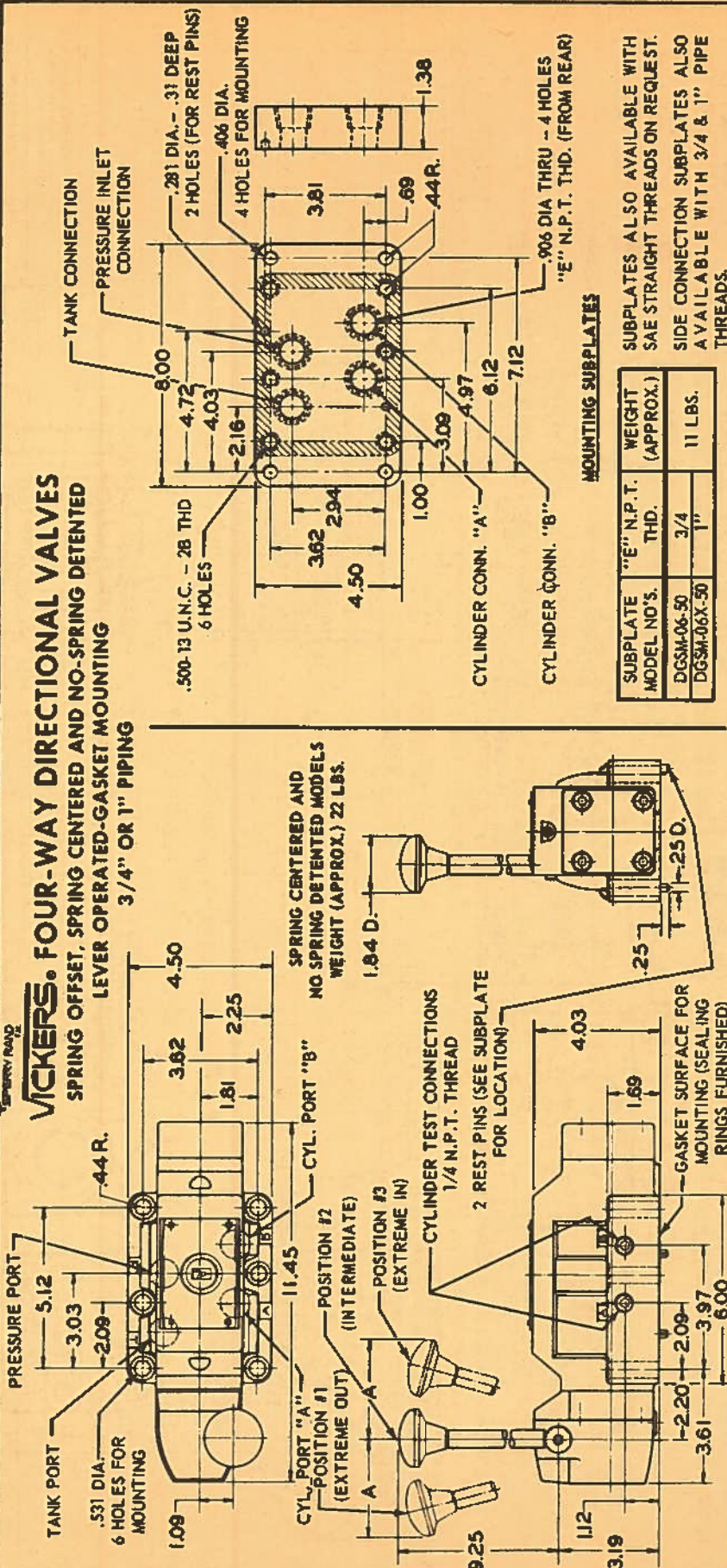
**I-3288**

CHECKED BY: 12-30 CAL  
DRAWN BY: 12-30 N.M.  
DATE: 12-30 JRG



SPERRY RAND

# **VICKERS. FOUR-WAY DIRECTIONAL VALVES** SPRING OFFSET, SPRING CENTERED AND NO-SPRING DETENTED LEVER OPERATED-GASKET MOUNTING 3/4" OR 1" PIPING



VICKERS DIVISION  
 OF SPERRY RAND CORPORATION  
 TROY, MICHIGAN 48064

FOUR-WAY  
 DIRECTIONAL VALVES

LEVER  
 OPERATED

3/4" OR 1"  
 PIPING

GASKET  
 MOUNTING

DWG NO.  
 514700

SUBPLATES ALSO AVAILABLE WITH  
 SAE STRAIGHT THREADS ON REQUEST.  
 SIDE CONNECTION SUBPLATES ALSO  
 AVAILABLE WITH 3/4" & 1" PIPE  
 THREADS.

SUBPLATE MODEL NO.'S	"E" N.P.T. THD.	WEIGHT (APPROX.)
DGSM-06-50	3/4"	11 LBS.
DGSM-06X-50	1"	11 LBS.

## **MOUNTING SUBPLATES**

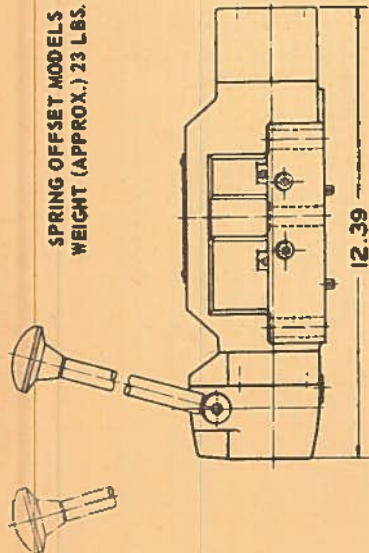
DIRECTION OF OIL FLOW FOR LEVER POSITIONS			APPROX. LEVER SHIFTING FORCE REQUIRED
POSITION #1	POSITION #2 APPLIES TO: 1. SPRING CENTERED OR NO- SPRING DETENTED MODELS 2. SPRING OFFSET MODELS AT CENTER CROSSOVER	POSITION #3 (NORMAL FOR SPRING OFFSET)	
PR. → CYL. B CYL. A → TANK	PR., CYL. A & CYL. B → TANK	PR. → CYL. A CYL. B → TANK	15 LBS. OR LESS AT 35 GPM & 3000 PSI
PR. → CYL. A CYL. B → TANK	PR., CYL. A & CYL. B BLOCKED	PR. → CYL. B CYL. A → TANK	
PR. → CYL. B CYL. A → TANK	CYL. A & CYL. B BLOCKED	PR. → CYL. A CYL. B → TANK	
PR. → CYL. A CYL. B → TANK	CYL. A & CYL. B BLOCKED	PR. → CYL. B CYL. A → TANK	
PR. → CYL. B CYL. A → TANK	CYL. A & CYL. B BLOCKED	PR. → CYL. A CYL. B → TANK	
PR. → CYL. A CYL. B → TANK	CYL. A & CYL. B BLOCKED	PR. → CYL. B CYL. A → TANK	FULL FLOW RESTRICTED FLOW
PR. → CYL. B CYL. A → TANK	CYL. A & CYL. B BLOCKED	PR. → CYL. A CYL. B → TANK	

514700

SEC  
 f

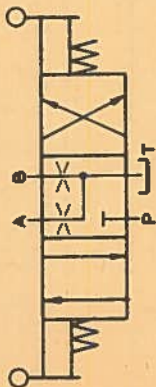


NORMAL POSITION

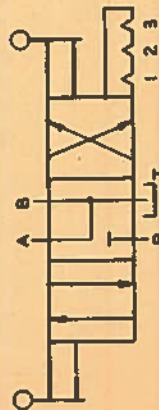


SPRING OFFSET TYPE VALVES ARE EQUIPPED WITH AN INTERNAL SPRING TO RETURN THE LEVER TO THE NORMAL POSITION (EXTREME IN) WHEN LEVER IS RELEASED. REFER TO TABLE ON FACE SIDE OF DWG. FOR MODELS AVAILABLE.

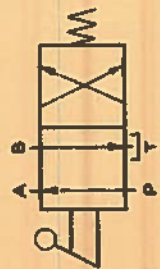
### TYPICAL GRAPHICAL SLIDING SPOOL SYMBOLS



SPRING CENTERED



NO-SPRING DETENTED



SPRING OFFSET

### GENERAL USAGE

THE DG17 LEVER OPERATED VALVES ARE IDEALLY SUITED FOR APPLICATIONS REQUIRING A MANUALLY OPERATED, FOUR-WAY DIRECTIONAL VALVE. VALVES IN THIS SERIES ARE AVAILABLE IN THE FOLLOWING BASIC TYPES: NO-SPRING DETENTED, SPRING CENTERED, AND SPRING OFFSET.

### RATINGS

MAXIMUM OPERATING PRESSURE . . . . . 3000 PSI  
MAXIMUM TANK LINE BACK PRESSURE . . . . . 2000 PSI  
MAXIMUM RECOMMENDED FLOW AT 3000 PSI . . . . . 35 GPM  
MAXIMUM FLOW WITHOUT MALFUNCTION . . . . . 45 GPM  
FLUID FILTRATION REQUIRED. . . . . 25 MICRON OR FINER

### PSI PRESSURE DROP CHART

SPOOL TYPE	FLOW PATH					
	P TO A	B TO T	P TO B	A TO T	CENTERED P TO T	
0	14	20	12	14	15	
2	14	37	14	37		
4	32	40	42	46	30	
6	14	24	14	16		
8	30	40	40	46	30	
33	14	32	14	32		

1. FIGURES IN PRESSURE DROP CHART GIVE APPROXIMATE PRESSURE DROPS ( $\Delta P$ ) WHEN PASSING 35 GPM FLOW (Q) OF 100 SUS FLUID(S) HAVING .865 SPECIFIC GRAVITY.

2. FOR ANY OTHER FLOW RATE ( $Q_1$ ), THE PRESSURE DROP ( $\Delta P_1$ ) WILL BE APPROXIMATELY:

$$\Delta P_1 = \Delta P (Q_1 / Q)^2$$

MODEL CODE

F3 - DG17S4 - 06 - 1 - 50

DESIGN NUMBER. SUBJECT TO CHANGE.  
INSTALLATION DIMENSIONS REMAIN AS SHOWN FOR DESIGNS 50 THRU 59.

SPOOL - SPRING ARRANGEMENT:  
A - SPRING OFFSET  
C - SPRING CENTERED  
N - NO-SPRING DETENTED

SPOOL TYPES: 0, 2, 4, 6, 8, & 33. SEE MODEL NUMBER TABULATION ON FRONT PAGE FOR DESCRIPTION.

VALVE SIZE

DIRECTIONAL CONTROL VALVE: GASKET MOUNTING, MANUAL LEVER OPERATED, SLIDING SPOOL, 4-WAY FLOW DIRECTION.

SPECIAL SEALS (OMIT IF NOT REQUIRED). SEE FLUIDS AND SEALS NOTE.

3. FOR ANY OTHER VISCOSITY(S), THE PRESSURE DROP ( $\Delta P$ ) WILL CHANGE AS FOLLOWS:

OTHER VISCOSITY(S)	75	150	200	250	300	350	400
% OF $\Delta P$ (APPROX.)	93	111	119	126	132	137	141

4. FOR ANY OTHER SPECIFIC GRAVITY ( $G_1$ )\*, THE PRESSURE DROP ( $\Delta P_1$ ) WILL BE APPROXIMATELY:

$$\Delta P_1 = \Delta P (G_1 / G)$$

\*SPECIFIC GRAVITY OF FLUID MAY BE OBTAINED FROM ITS PRODUCER. THE VALUE IS HIGHER FOR FIRE-RESISTANT FLUIDS THAN FOR OIL.

### FLUIDS AND SEALS

THE USE OF SYNTHETIC, FIRE-RESISTANT FLUIDS REQUIRES A VALVE WITH SPECIAL SEALS. ADD PREFIX "F3" TO MODEL NUMBER WHEN PHOSPHATE ESTERS OR CHLORINATED HYDROCARBONS ARE TO BE USED. WATER BASE FLUIDS AND PETROLEUM OIL MAY BE USED WITH STANDARD SEALS.

### SUBPLATES AND BOLT KITS

MOUNTING BOLTS ARE NOT INCLUDED WITH VALVES OR SUBPLATES. BOLTS SHOULD BE SAE GRADE 6, OR BETTER. ORDER BOLTS AND SUBPLATES SEPARATELY. NOTE: CENTER MOUNTING BOLTS (2) ARE OPTIONAL. ALL SIX BOLTS ARE RECOMMENDED FOR PRESSURE RANGE OF 2000 TO 3000 PSI FOR MAXIMUM SEAL LIFE.

EXAMPLE: (1) DG17S4-06N-50 VALVE

(1) DGSM-06-50 SUBPLATE

(1) BKDG06-635 BOLT KIT

### MAXIMUM RECOMMENDED MOUNTING

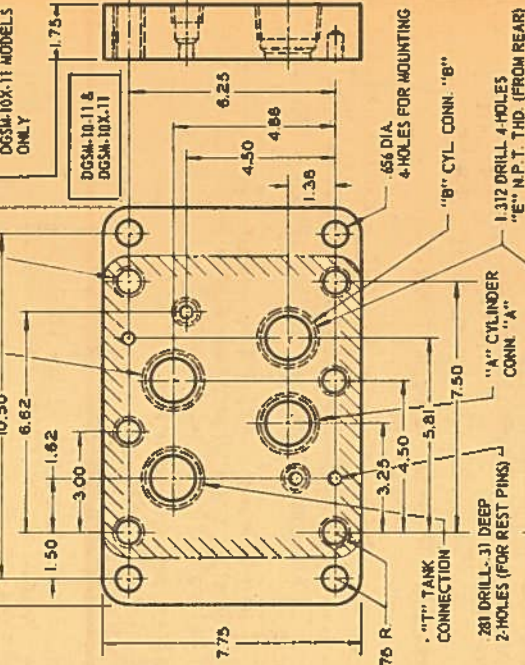
BOLT TORQUE . . . . . 700 IN. LBS.  
WHEN SUBPLATE IS NOT USED, A MACHINED PAD (AS INDICATED BY SUBPLATE SHADED AREA) MUST BE PROVIDED FOR MOUNTING; PAD MUST BE FLAT AND SMOOTH.



## MOUNTING SUBPLATES

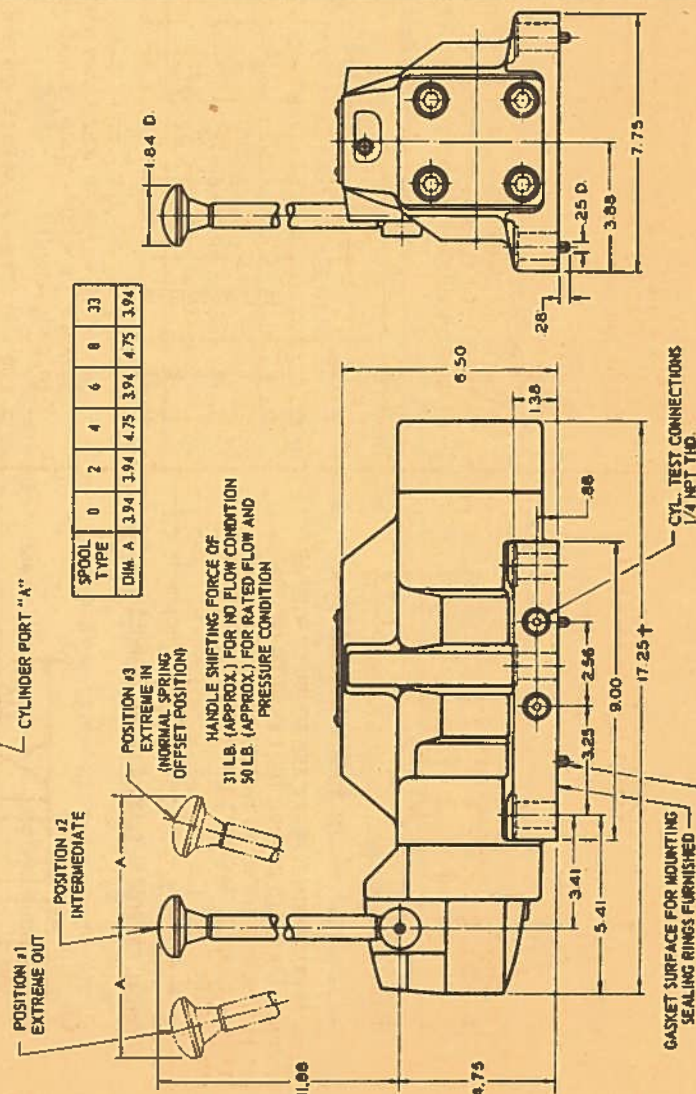
'P' PRESS. INLET CONN. — 750-10 U.N.C.-2B TAP  
6-HOLES

FOR DGS-10-11 &  
DGS-10X-11 MODELS  
ONLY



- **FOUR-WAY SPRING CENTERED**  
TYPE DG1754-10-C-50
- **FOUR-WAY NO SPRING WITH**  
DETENTED TYPE DG1754-10-N-50
- **FOUR-WAY SPRING OFFSET**  
MODELS (DG1754-10-A-50) HAVE  
AN INTERNAL SPRING WHICH  
RETURNS SPOOL WHEN MANUAL  
LEVER IS RELEASED. OVERALL  
DIMENSION BECOMES 19.03

SPOOL TYPE	0	2	4	6	8	33
DIM. A	394	394	475	394	475	394



SUB-PLATE MODEL NO.	E N.P.T. THD	USE MAX. PSI	WGT. LBS.
DGSM-10-11	1-1/4	3000	38
DGSM-10X-11	1-1/2		46
DGSM-10Y-11	2		

FOR DGS-10Y-11 MODEL ONLY. FOR  
OTHER DIMENSIONS SEE VIEW ABOVE.



## GENERAL INFORMATION

THE DG17 LEVER OPERATED VALVES ARE IDEALLY SUITED FOR APPLICATIONS REQUIRING A MANUALLY OPERATED, FOUR-WAY DIRECTIONAL VALVE. FOUR-WAY VALVES OF THIS SERIES ARE AVAILABLE IN THE FOLLOWING BASIC TYPES:

- NO SPRING DETENTED
- SPRING DETENTED
- SPRING OFFSET

## RATINGS

SPOOL SYMBOL	MAXIMUM GPM FLOW AT MAXIMUM PRESSURE				
	1000 PSI	2000 PSI	3000 PSI	4000 PSI	5000 PSI
0		90	75		
2		90	90		
4		90	90		
6	90	90	90		
8		90	90		
33		90	90		

MAXIMUM TANK LINE BACK PRESSURE..... 3000 PSI

FLUID FILTRATION REQUIRED..... 25 MICRON OR LESS

## PSI PRESSURE DROP CHART

SPOOL TYPE	FLOW PATH				
	P TO A	B TO T	P TO B	A TO T	CENTERED P TO T
0	47	61	44	67	51
2	36	55	39	53	
4	60	120	60	134	54
6	34	32	37	30	
8	51	118	57	129	52
33	36	53	38	51	

1. THE FIGURES SHOWN IN THE PRESSURE DROP CHART GIVE APPROXIMATE PRESSURE DROPS ( $\Delta P$ ) WHEN PASSING THE NOMINAL 100 GPM FLOW (OF 100 SSU FLUIDS), HAVING .865 SPECIFIC GRAVITY.

2. FOR ANY OTHER FLOW RATE ( $Q_1$ ), THE PRESSURE DROP ( $\Delta P_1$ ) WILL BE APPROXIMATELY:  
 $\Delta P_1 = \Delta P (Q_1 / Q)^2$

3. FOR ANY OTHER VISCOSITY(S), THE PRESSURE DROP ( $\Delta P$ ) WILL CHANGE AS FOLLOWS:

OTHER VISCOSITY(S) % OF ( $\Delta P$ ) (APPROX.)	75	150	200	250	300	350	400
	93	111	119	126	132	137	141

4. FOR ANY OTHER SPECIFIC GRAVITY ( $G_1$ ), THE PRESSURE DROP ( $\Delta P_1$ ) WILL BE APPROXIMATELY:  $\Delta P_1 = \Delta P (G_1 / G)$

\*SPECIFIC GRAVITY OF FLUID MAY BE OBTAINED FROM ITS PRODUCER. FOR FIRE-RESISTANT FLUIDS THE VALUE IS HIGHER THAN FOR OIL.

## INSTALLATION

MOUNTING SUBPLATES ARE AVAILABLE FROM VICKERS. WHEN SUBPLATE IS NOT USED, A MOUNTING PAD, AS INDICATED BY THE SHADED AREA ON SUBPLATE DRAWING (SEE FRONT PAGE) MUST BE PROVIDED FOR MOUNTING. PAD MUST BE FLAT AND SMOOTH. SUBPLATE OR MOUNTING BOLTS ARE NOT INCLUDED WITH THESE VALVES. THEY MUST BE ORDERED SEPARATELY.

## EXAMPLE:

ONE (1) DG1754-100C-50 VALVE  
 ONE (1) DG5M-10Y-11 SUBPLATE  
 ONE (1) BKDG-10-836 MOUNTING BOLT KIT

MOUNTING BOLTS SHOULD BE SAE GRADE 4, OR BETTER.

## MODEL CODE

DG1754 - 10 0 C - 50

DESIGN NUMBERS SUBJECT TO CHANGE. INSTALLATION DIMENSIONS REMAIN AS SHOWN FOR DESIGN NUMBERS 50 THRU 59.

SPOOL SPRING ARRANGEMENT

A - SPRING OFFSET  
 C - SPRING CENTERED  
 N - NO SPRING DETENTED

SPOOL SYMBOL

0, 2, 4, 6, 8, 33

(SEE CHART BELOW FOR EXPLANATION)

WEIGHT..... 94 LBS.

## TYPICAL GRAPHICAL SLIDING SPOOL SYMBOLS



SPRING CENTERED



NO SPRING DETENTED



SPRING OFFSET

MODEL NUMBER	SPRING CENTERED	SPRING OFFSET	DIRECTION OF OIL FLOW FOR HANDLE POSITION		
			INTERMEDIATE	EXTREME IN	EXTREME OUT
DG1754-100N-50			PR, CYL A & CYL B TANK	PR, CYL A CYL B TANK	PR, CYL B CYL A TANK
DG1754-102N-50			PR, CYL A & CYL B TANK	PR, CYL A CYL B TANK	PR, CYL B CYL A TANK
DG1754-104C-50			PR, CYL A & CYL B TANK	PR, CYL A CYL B TANK	PR, CYL B CYL A TANK
DG1754-106C-50			PR, CYL A & CYL B TANK	PR, CYL A CYL B TANK	PR, CYL B CYL A TANK
DG1754-108C-50			PR, CYL A & CYL B TANK	PR, CYL A CYL B TANK	PR, CYL B CYL A TANK
DG1754-1033C-50			PR, CYL A & CYL B TANK	PR, CYL A CYL B TANK	PR, CYL B CYL A TANK



# **VICKERS** SHUT-OFF VALVES CAM AND ROLLER OPERATED

OPERATION OF VALVE IS USUALLY BY CAM, AS DECELERATION RANGE OF CONTROL ON SHUTTING OFF, OPERATING CAM SHOULD BE ADJUSTABLE TO CONDITIONS. MAXIMUM CAM DEPRESSION SHOULD BE APPROXIMATELY 1/8" PLUNGER IS DERESSED AGAINST A MAXIMUM SPRING LOAD OF APPROXIMATELY 84 LBS. FOR 3/4" VALVES AND 74 LBS. FOR 1-1/4" VALVES, THIS LOAD BEING INDEPENDENT OF HYDRAULIC PRESSURE.

NORMALLY OPEN TYPE VALVES ALLOW FLOW IN 'CONTROLLED' DIRECTION WHEN PLUNGER IS IN EXTENDED POSITION.

NORMALLY CLOSED TYPE VALVES BLOCK FLOW IN 'CONTROLLED' DIRECTION WHEN PLUNGER IS IN EXTENDED POSITION.

VALVES WITH INTEGRAL CHECK VALVE ALLOW FLOW IN 'FREE' DIRECTION REGARDLESS OF POSITION OF PLUNGER.

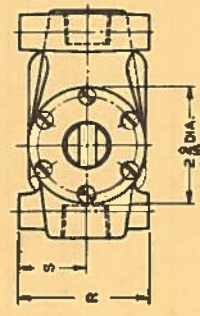
MAXIMUM OPERATING PRESSURE, RECOMMENDED ----- 2000 PSI.

NORMAL LEAKAGE OF VALVES WILL BE APPROXIMATELY 10 GIL. IN. PER MIN. UNDER NORMAL OPERATING CONDITIONS.

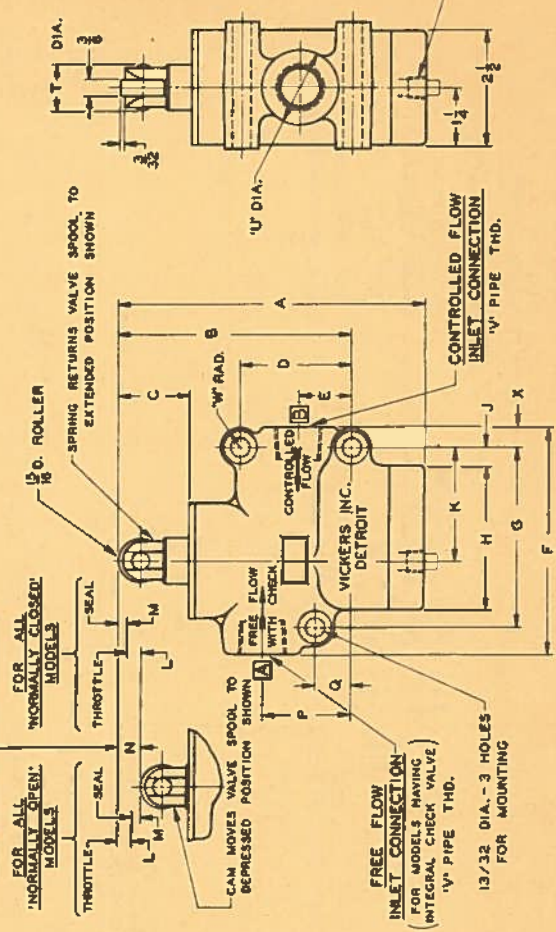
DRAIN CONNECTION MUST BE PIPED DIRECTLY TO TANK THRU A SURGE FREE LINE. DOWN LINE PRESSURE MUST NOT EXCEED 10 PSI.

MODEL NUMBERS	SYSTEM CONNECTION LOCATIONS	VALVE TYPE	OIL FLOW
3/4 PIPE SIZE	1-1/4 PIPE LOCATIONS	PLUNGER DERESSED	
C-712	C-715	NORMALLY OPEN WITH CHECK	A→B; B→A
C-714	REAR	NORMALLY OPEN WITH CHECK	A→B
C-712-A	C-715-A	NORMALLY CLOSED WITH CHECK	A→B; B→A
C-714-A	REAR	NORMALLY CLOSED WITH CHECK	A→B
C-742	SIDE	NORMALLY OPEN WITHOUT CHECK	A→B; B→A
C-742-A	SIDE	NORMALLY CLOSED WITHOUT CHECK	A→B; B→A

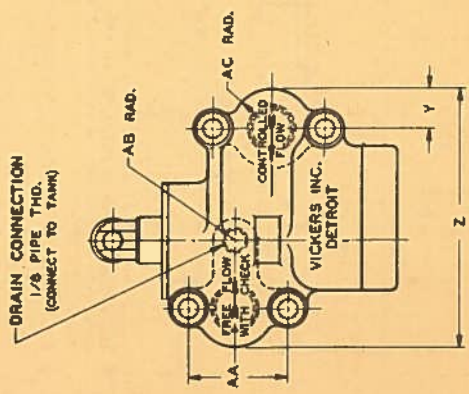
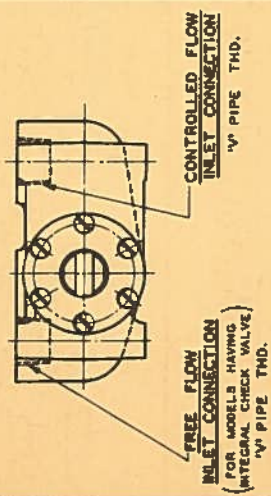
## **SIDE CONNECTION MODELS**



TOTAL VALVE SPOOL MOVEMENT



## **REAR CONNECTION MODELS**



MODEL NUMBERS	SYSTEM CONNECTION LOCATIONS	RATED CAPACITY GPM	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC
C-712	C-712-A	20	6 1/2	4 1/2	11 1/2	3 1/2	1 1/2	4 1/2	3 1/2	3 1/2	3 1/2	2 1/2	5 1/2	3 1/2	3 1/2	1 1/2	3 1/2	2 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
C-714	C-714-A	20	6 1/2	4 1/2	11 1/2	3 1/2	1 1/2	4 1/2	3 1/2	3 1/2	3 1/2	2 1/2	5 1/2	3 1/2	3 1/2	1 1/2	3 1/2	2 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
C-742	C-742-A	20	6 1/2	4 1/2	11 1/2	3 1/2	1 1/2	4 1/2	3 1/2	3 1/2	3 1/2	2 1/2	5 1/2	3 1/2	3 1/2	1 1/2	3 1/2	2 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
C-715	C-715-A	50	7 1/2	5 1/2	12 1/2	4 1/2	2 1/2	5 1/2	4 1/2	4 1/2	4 1/2	3 1/2	6 1/2	4 1/2	4 1/2	2 1/2	4 1/2	3 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2

VICKERS INC. DETROIT  
INSTALLATION DRAWING  
T 137498

DIRECTIONAL CONTROLS | SHUT-OFF VALVES | ROLLER OPERATED | 3/4 & 1-1/4 PIPE SIZES | THREADED CONNECTIONS | INST. DRWG. I-137498



# **VICKERS** SHUT-OFF VALVES CAM AND ROLLER OPERATED GASKET MOUNTING FOR 3/4" PIPING

OPERATION OF VALVE IS USUALLY BY CAM. AS DECELERATION RANGE OF CONTROL PLUNGER DEPENDS UPON VOLUME, OPERATING CAM SHOULD BE ADJUSTABLE TO CONDITIONS. MAXIMUM CAM DEPRESSING ANGLE RECOMMENDED IS 15 DEGREES. PLUNGER IS DEPRESSOR. ADJUST MAXIMUM SPRING LOAD OF APPROXIMATELY 44 LBS. THIS LOAD BEING INDEPENDENT OF HYDRAULIC PRESSURE.

NORMALLY OPEN TYPE VALVES ALLOW FLOW IN 'CONTROLLED' DIRECTION WHEN PLUNGER IS IN EXTENDED POSITION.

NORMALLY CLOSED TYPE VALVES BLOCK FLOW IN 'CONTROLLED' DIRECTION WHEN PLUNGER IS IN EXTENDED POSITION.

VALVES WITH INTEGRAL CHECK VALVE ALLOW FLOW IN 'FREE' DIRECTION REGARDLESS OF POSITION OF PLUNGER.

MAXIMUM OPERATING PRESSURE RECOMMENDED-----2000 P.S.I.

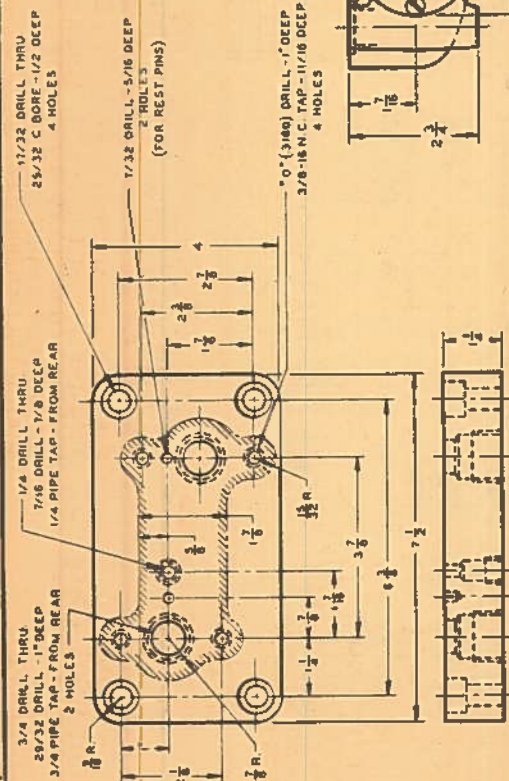
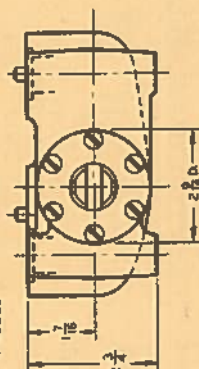
MAXIMUM RATED CAPACITY-----20 G.P.M.

NORMAL LEAKAGE OF VALVES WILL BE APPROXIMATELY 10 CU. IN. PER MIN. UNDER NORMAL OPERATING CONDITIONS.

DRAIN CONNECTION MUST BE PIPED DIRECTLY TO TANK.

WEIGHT (APPROXIMATE) VALVE-----12 LBS.

SUB-PLATE-----9 1/2 LBS.



## **MOUNTING SUB-PLATE**

MOUNTING SUB-PLATES ARE AVAILABLE FROM VICKERS AND MUST BE SPECIFIED IN ADDITION TO THE MODEL NUMBER OF UNIT SELECTED.

EXAMPLE: ONE (1) CC-714-A VALVE  
ONE (1) CCN-714-10 SUB-PLATE

WHEN SUB-PLATE IS NOT USED A MACHINED PAD SUGGESTED BY SHADED AREA MUST BE PROVIDED FOR MOUNTING. PAD MUST BE FLAT AND SMOOTH.

## **TOTAL VALVE SPOOL MOVEMENT**

FOR ALL 'NORMALLY OPEN' MODELS

FOR ALL 'NORMALLY CLOSED' MODELS

THROTTLE SEAL

THROTTLE SEAL

THROTTLE SEAL

THROTTLE SEAL

THROTTLE SEAL

THROTTLE SEAL

THROTTLE SEAL

THROTTLE SEAL

THROTTLE SEAL

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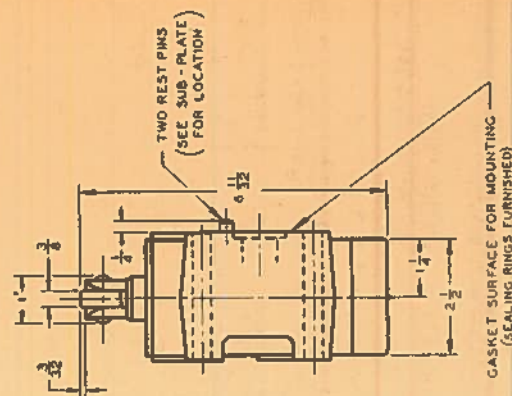
THROTTLE SEAL

THROTTLE SEAL

THROTTLE SEAL

THROTTLE SEAL

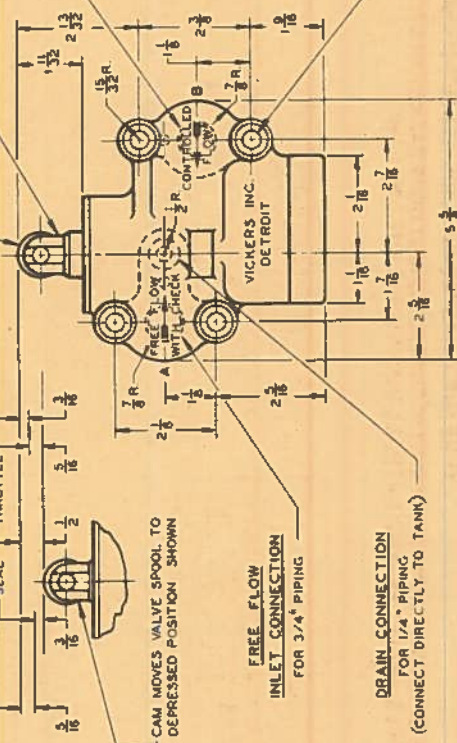
THROTTLE SEAL



SPRING RETURNS VALVE SPOOL TO EXTENDED POSITION SHOWN

CONTROLLED FLOW INLET CONNECTION FOR 3/4" PIPING

13/32 DIA - 4 HOLES FOR MOUNTING



MODEL NUMBERS	VALVE TYPE	OIL FLOW	
		PLUNGER RELEASED	PLUNGER DEPRESSOR
CC-714	NORMALLY OPEN WITH CHECK	A → B, B → A	A → B
CC-714-A	NORMALLY CLOSED WITH CHECK	A → B	A → B, B → A

VICKERS INC.	DETROIT, MICH.
INSTALLATION DRAWING	I.172902
DATE	11-1-54
BY	J. H. HARRIS
CHECKED	J. H. HARRIS
APPROVED	J. H. HARRIS

DIRECTIONAL CONTROLS | SHUT-OFF VALVE | ROLLER OPERATED | 3/4" FOR PIPING | GASKET MOUNTING | INST. DRWG. I.172902



# VICKERS® DECELERATION VALVES

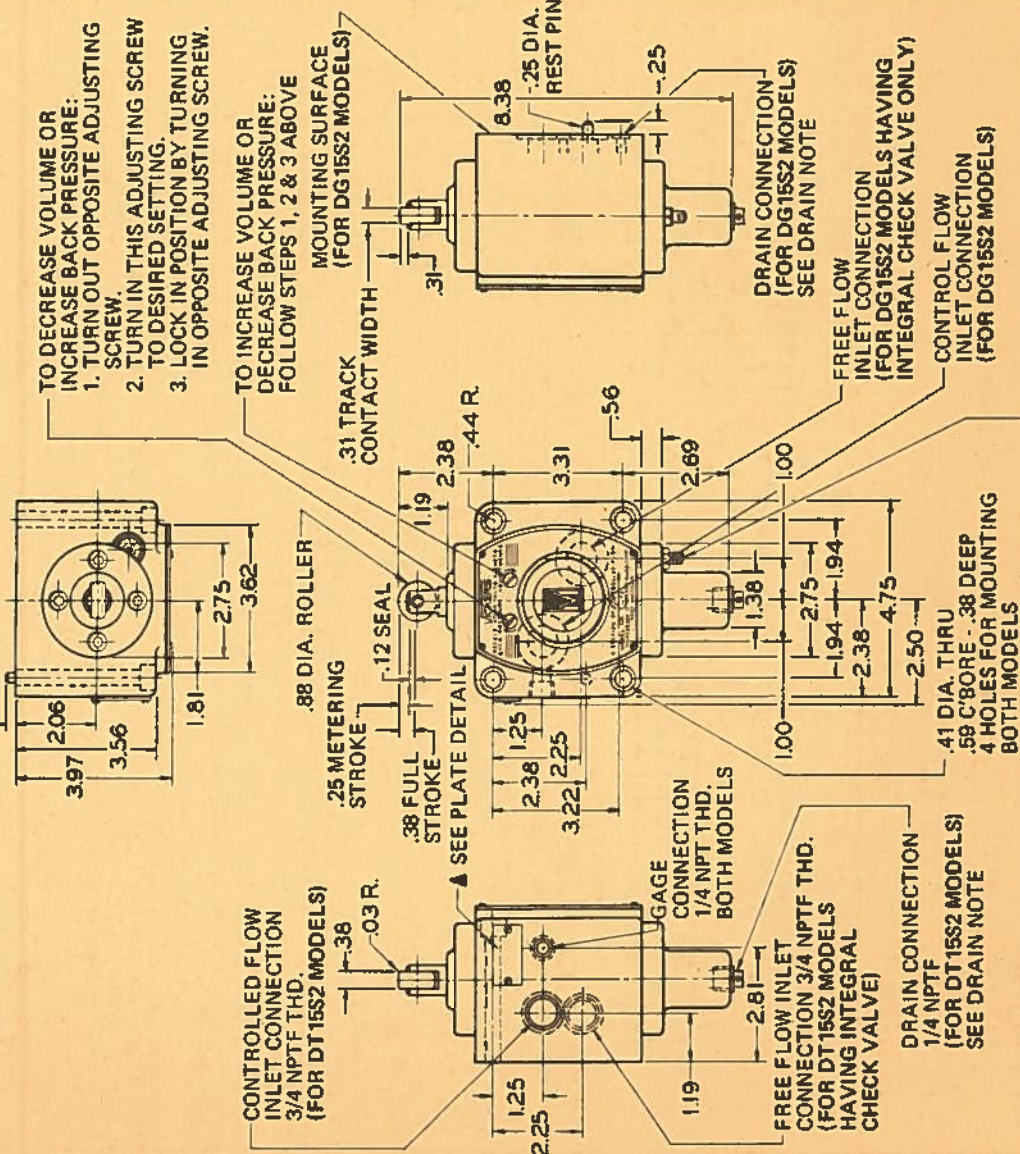
SERIES D\*15S2-080-10  
NORMALLY OPEN TYPE

THREADED, GASKET OR SUBPLATE MOUNTING

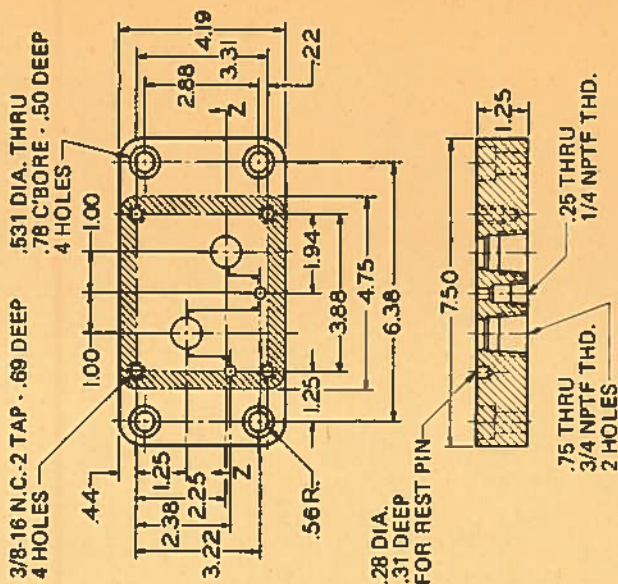
THIS DRAWING COMBINES THE DT15 THREADED AND DG15 GASKET MOUNTED MODELS. MOUNTING AND OVERALL DIMENSIONS ARE THE SAME.

ADJUST BACK PRESSURE  
AT THIS GAGE PORT  
AS LOW AS POSSIBLE  
AND STILL OBTAIN  
PROMPT DECELERATION  
WHEN INITIALLY  
DEPRESSING SPOOL

▲ PLATE DETAIL



## MOUNTING SUBPLATES



SUBPLATES AND BOLT KITS  
VALVES, SUBPLATES, AND MOUNTING BOLTS MUST  
BE ORDERED SEPARATELY.

EXAMPLE: ONE (1) DG15S2-080-K-10 VALVE  
ONE (1) DG15M-08-10 SUBPLATE OR  
ONE (1) DG15M-08-10 SUBPLATE  
ONE (1) BKDG15-06-627 BOLT KIT

NOTE: SUBPLATE MODEL DG15M-08-10 IS IDENTICAL  
TO MODEL DG15M-06-10 EXCEPT IT HAS 1" PIPE  
THREAD CONNECTIONS.

WHEN SUBPLATE IS NOT USED, A MACHINED PAD (AS  
INDICATED BY SUBPLATE SHADED AREA) MUST BE  
PROVIDED FOR MOUNTING; PAD MUST BE FLAT WITH  
IN .0005 INCH AND SMOOTH WITHIN 63 MICROINCH.  
MOUNTING BOLTS, WHEN PROVIDED BY CUSTOMER,  
SHOULD BE SAE GRADE 7, OR BETTER.

VICKERS DIVISION  
OF SPERRY RAND CORPORATION  
TROY, MICHIGAN 48064

DIRECTIONAL  
CONTROLS

DECELERATION  
VALVES

CAM OR ROLLER  
OPERATED

3/4"  
PIPE SIZE

THREADED, GASKET OR  
SUBPLATE MOUNTING

DWG. NO.  
515300

REVISED 12-1-71

515300



# VICKERS® DECELERATION VALVES

SERIES D\*15S2-060-10  
NORMALLY OPEN TYPE  
THREADED, GASKET OR SUBPLATE MOUNTING

## GENERAL DATA

THESE DECELERATION VALVES PROVIDE AN IDEAL METHOD OF HYDRAULICALLY CONTROLLED DECELERATION THROUGH MECHANICAL ACTION. THEY ARE ADJUSTABLE TO ACCOMMODATE A VARIETY OF MACHINE CONDITIONS.

## RATINGS

**PRESSURE (MAXIMUM)**..... 3000 PSI  
CARE SHOULD BE USED IN DESIGNING THE CAM TO ACTUATE THESE VALVES TO OBTAIN GOOD DECELERATION. THE MASS TO BE STOPPED SHOULD NOT BE PERMITTED TO GENERATE PRESSURES IN EXCESS OF THE ABOVE RATINGS.

## FLOW

**CONTROLLED FLOW (NOMINAL)**..... 5 TO 25 GPM  
UNITS CAN BE USED WITH FLOWS UP TO 60 GPM WITHOUT MALFUNCTION. SEE PARAGRAPH ON ADJUSTABLE BACK PRESSURE. IT IS NOT EXPECTED THAT THE VALVES WILL BE USED WITH INITIAL FLOWS OF LESS THAN 5 GPM.

## REVERSE FLOW

MODELS WITH BUILT-IN CHECK PERMIT REVERSE FLOW AS INDICATED:  
SPOOL EXTENDED..... 30 PSI WITH 25 GPM\*  
SPOOL DEPRESSED..... 60 PSI WITH 25 GPM\*  
\*AT FLOW RATES ABOVE OR BELOW THOSE INDICATED MINIMUM BACK PRESSURE IS DIRECTLY PROPORTIONAL TO THE SQUARE OF THE FLOW RATE.

## DRAIN

DRAIN PORT MUST BE CONNECTED TO TANK THRU A SURGE FREE LINE. DRAIN LINE PRESSURE MUST NOT EXCEED 25 PSI.

## ADJUSTABLE BACK PRESSURE

FOR A GIVEN FLOW, INITIAL BACK PRESSURE CAN BE ADJUSTED TO REDUCE EXCESSIVE FREE TRAVEL OF SPOOL PRIOR TO START OF DECELERATION. (INSTRUCTIONS ON NAMEPLATE.)

WHEN MAKING ADJUSTMENT, WITH SPOOL EXTENDED, MINIMUM POSSIBLE VALUES FOR VARIOUS INITIAL FLOWS ARE TABULATED BELOW. ANY PRESSURE AT DISCHARGE PORT MUST BE ADDED

INITIAL FLOW RATE* GPM	INITIAL MINIMUM ADJUSTABLE BACK PRESSURE PSI (APPROX.)
10	20
15	45
20	80
25	125
30	180

## LEAKAGE

TOTAL LEAKAGE AT 1000 PSI IS APPROXIMATELY 3 CU. IN./MIN., 100 SSU FLUID.

## CAM AND ROLLER DATA

MAXIMUM CAM ANGLE 35°  
MAXIMUM FORCE TO DEPRESS SPOOL APPROXIMATELY 80 POUNDS.

## NEEDLE VALVE

IS INCLUDED TO PROVIDE CONTROLLED FLOW BETWEEN PORTS WHEN THE SPOOL IS FULLY DEPRESSED.

## BUILT-IN CHECK VALVE (OPTION)

PROVIDES FREE FLOW IN DIRECTION OPPOSITE CONTROLLED FLOW REGARDLESS OF SPOOL POSITION. REFER TO MODEL CODE ON HOW TO ORDER.

**FILTRATION**..... 25 MICRON

## FLUIDS AND SEALS

THE USE OF SYNTHETIC, FIRE RESISTANT FLUIDS REQUIRE A VALVE WITH SPECIAL SEALS. ADD PREFIX "F3" TO MODEL NUMBER WHEN PHOSPHATE ESTERS OR CHLORINATED HYDROCARBONS ARE TO BE USED. WATER GLYCOL, WATER-IN-OIL EMULSIONS AND PETROLEUM OIL FLUIDS MAY BE USED WITH STANDARD SEALS.

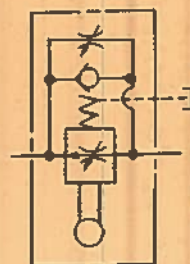
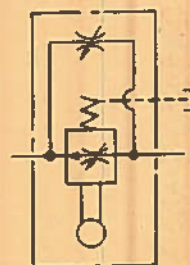
## WEIGHT LBS. (APPROX.)

VALVES..... 21.5  
SUBPLATE..... 11.5

## MODEL CODE

F3 - D T 15 S 2 - 06 0 - (K) - 10  
SPECIAL SEALS  
SEE FLUIDS NOTE  
DECELERATION VALVE  
MOUNTING  
G - GASKET OR SUBPLATE  
T - THREADED CONNECTIONS  
ADJUSTABLE DECELERATION  
SLIDING SPOOL TYPE  
FLOW DIRECTION  
2 - 2-WAY  
DESIGN NUMBER  
SUBJECT TO CHANGE. INSTALLATION DIMENSIONS REMAIN AS SHOWN FOR DESIGN NUMBERS 10 THRU 19.  
CHECK VALVE  
(OMIT IF NOT REQUIRED)  
SPOOL  
NORMALLY OPEN TYPE  
NOMINAL PIPE SIZE  
06 - 3/4"

## STANDARD GRAPHICAL SYMBOLS FOR FLUID POWER DIAGRAMS



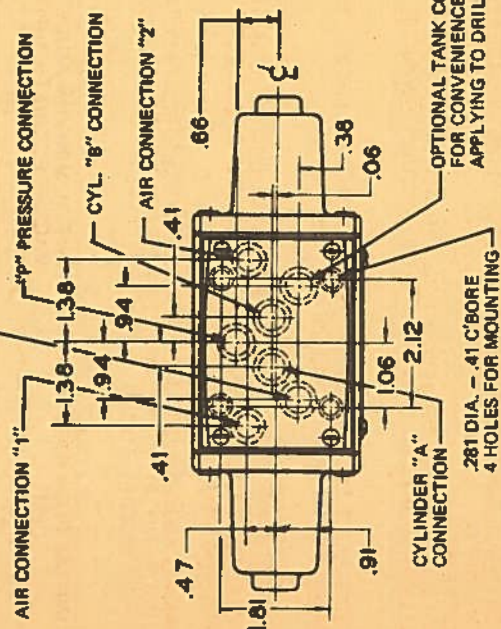


## AIR OPERATED FOUR WAY DIRECTIONAL VALVES

**MANIFOLD OR SUBPLATE MOUNTING**  
**MODEL SERIES DG18S\*-01\*A-50, DG18S4-01\*C-50 & DG18S\*-01\*N-51**

**DOUBLE AIR END COVER - SPRING CENTERED  
& NO-SPRING DETENTED TYPES**

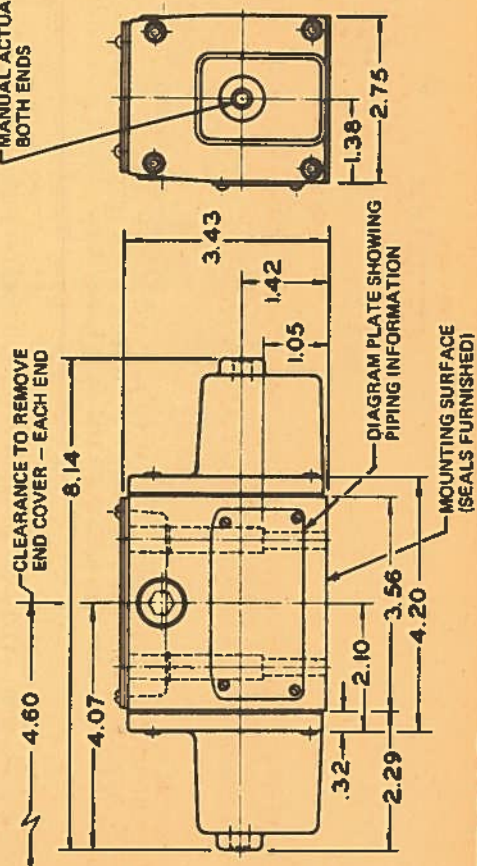
**"T" NORMAL TANK CONNECTION FOR FOUR-WAY MODELS  
(CONNECT TO RESERVOIR) ON TWO-WAY MODELS "T"  
CONN. IS DRAIN (SEE NOTES)**



**OPTIONAL TANK CONNECTION  
FOR CONVENIENCE OF USERS IN  
APPLYING TO DRILLED PANELS**

.281 DIA. - .41 C'BORE  
4 HOLES FOR MOUNTING -

**-MANUAL ACTUATOR  
BOTH ENDS**

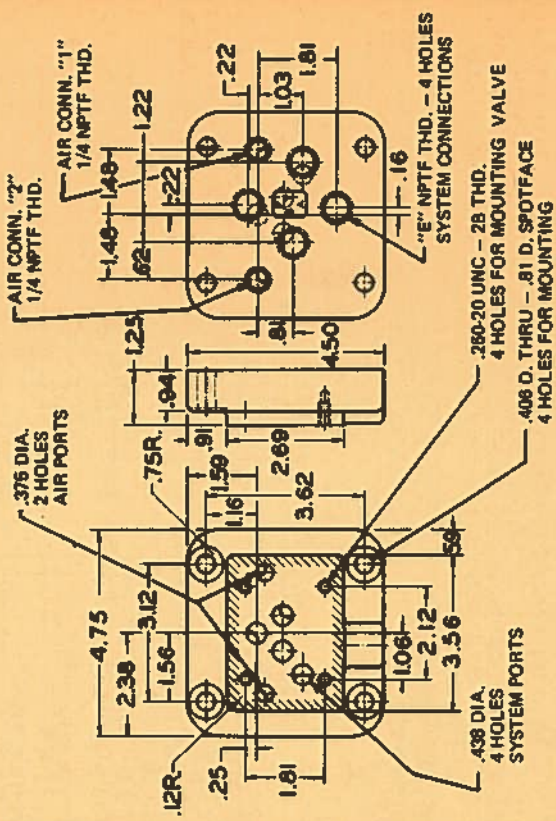


**DIAGRAM PLATE SHOWING  
PIPING INFORMATION**

**-MOUNTING SURFACE  
(SEALS FURNISHED)**

NOTE: TO USE THIS VALVE WITH THE VARIOUS VALVE MODULES SUCH AS DGC0-01 ETC., THE AIR CONNECTIONS MUST BE MADE EXTERNALLY AT AN ADJACENT PLATE PLACED BETWEEN THIS VALVE AND THE MODULE. THE PARTS REQUIRED ARE: (4) 10-35 SCREW, (4) 88907 LOCKWASHER, (5) 198811 O-RING AND PLATE 316810. THIS ARRANGEMENT CAN ALSO BE USED TO MOUNT THIS VALVE ON A DGS0-01 SUBPLATE OR SIMILAR MANIFOLD.

## **MOUNTING SUBPLATES**



SUBPLATE MODEL NO.	"E" NPFT THREAD
DG18M-01X-10	3/8
DG18M-01Y-10	1/2

SUBPLATE MODELS DG18M-01X-10 AND DG18M-01Y-10 ARE IDENTICAL WITH EXCEPTION OF PIPE THREAD SIZES AS SHOWN IN CHART.

REvised 12.1.78

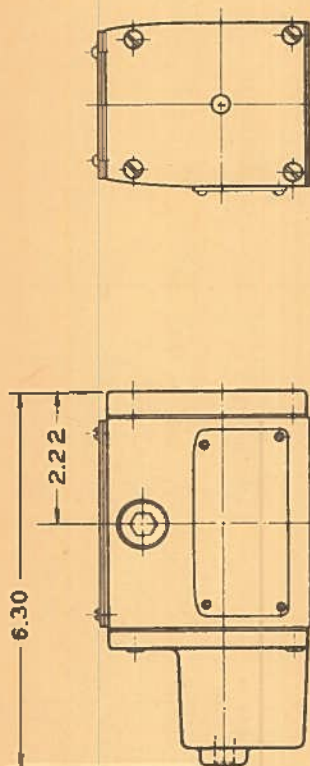
518850



# SPERRY-VICKERS AIR OPERATED FOUR WAY DIRECTIONAL VALVES

MANIFOLD OR SUBPLATE MOUNTING  
MODEL SERIES DG18S\*-01\*A-50, DG18S4-01\*C-50 & DG18S\*-01\*N-51

SINGLE AIR END COVER - SPRING OFFSET TYPE



SPRING OFFSET MODELS - WHEN AIR END COVER IS NOT PRESSURIZED  
THE SPOOL IS RETURNED TO THE OFFSET POSITION

MODEL NUMBERS		SPOOL TYPE	DIRECTION OF OIL FLOW FOR VALVE SPOOL POSITIONS WITH AIR PRESSURE CONTROL INDICATED		
NO-SPRING DETENTED	SPRING CENTERED	SPRING OFFSET	WITH SPOOL IN CENTER POSITION 1. SPRING CENTERED - BOTH AIR PRESSURE CONNECTIONS OFF 2. ALL OTHER MODELS AT CENTER CROSSOVER	AIR PRESS. -> "2" AIR CONNECTION "1" -> EXHAUST OR SPRING OFFSET	AIR PRESS. -> "1" AIR CONNECTION "2" -> EXHAUST SEE NOTE †
DG18S4-010N-50	DG18S4-010C-50	DG18S4-010A-50	"0" OPEN CENTER ALL PORTS PR. CYL. A & CYL. B -> TANK	PR. CYL. A CYL. B -> TANK	PR. -> CYL. B CYL. A -> TANK
DG18S4-012N-50	DG18S4-012C-50	DG18S4-012A-50	"2" CLOSED CENTER ALL PORTS PR. CYL. A & CYL. B BLOCKED	PR. -> CYL. A CYL. B -> TANK	PR. -> CYL. B CYL. A -> TANK
	DG18S4-013C-50		"3" CLOSED CENTER P & B PR. & CYL. B BLOCKED CYL. A -> TANK	PR. -> CYL. A CYL. B -> TANK	PR. -> CYL. B CYL. A -> TANK
	DG18S4-016C-50		"6" CLOSED CENTER P ONLY PR. BLOCKED CYL. A & CYL. B -> TANK	PR. -> CYL. A CYL. B -> TANK	PR. -> CYL. B CYL. A -> TANK
	DG18S4-017C-50		"7" TANK BLOCKED PR. TO A & B TANK BLOCKED	PR. -> CYL. B CYL. A -> TANK	PR. -> CYL. B CYL. A -> TANK
	DG18S4-018C-50		"8" TANDEM PR. -> TANK CYL. A & CYL. B BLOCKED	PR. -> CYL. B CYL. A -> TANK	PR. -> CYL. B CYL. A -> TANK
	DG18S4-0133C-50		"33" CLOSED CENTER BLEED A & B PR. BLOCKED CYL. A & CYL. B -> TANK	PR. -> CYL. A CYL. B -> TANK	PR. -> CYL. B CYL. A -> TANK
DG18S2-012N-50		DG18S2-012A-50	"2" 2-WAY PR. CYL. A & CYL. B BLOCKED	PR. -> CYL. A CYL. B BLOCKED	PR. -> CYL. B CYL. A BLOCKED

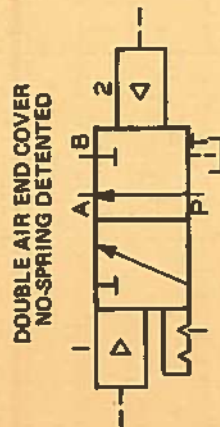
† AIR PRESSURE CONNECTIONS "1" AND "2"  
ARE IDENTIFIED ON UNIT BY DIAGRAM  
PLATE ON SIDE OF VALVE.



# **SPERRY VICKERS AIR OPERATED FOUR WAY DIRECTIONAL VALVES**

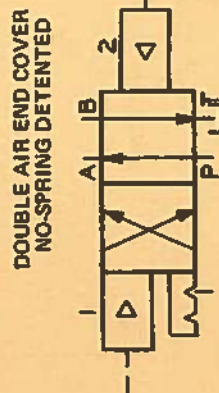
MANIFOLD OR SUBPLATE MOUNTING  
MODEL SERIES DG18S\*-01\*A-50, DG18S4-01\*C-50 & DG18S\*-01\*N-51

## TYPICAL GRAPHICAL SLIDING SPOOL SYMBOLS



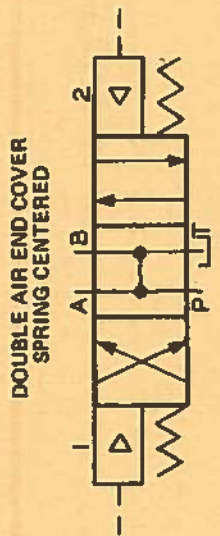
DOUBLE AIR END COVER  
NO-SPRING DETENTED

TWO-WAY VALVE



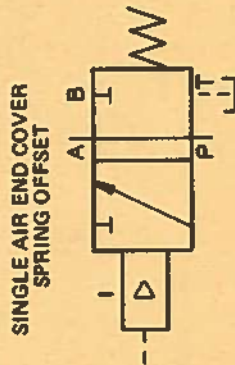
DOUBLE AIR END COVER  
NO-SPRING DETENTED

FOUR-WAY VALVE



DOUBLE AIR END COVER  
SPRING CENTERED

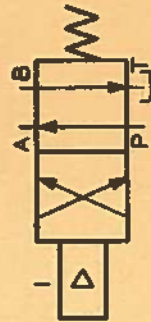
FOUR-WAY VALVE



SINGLE AIR END COVER  
SPRING OFFSET

TWO-WAY VALVE

SINGLE AIR END COVER  
SPRING OFFSET



FOUR-WAY VALVE

## GENERAL DATA

THESE AIR OPERATED VALVES ARE GENERALLY USED IN OIL HYDRAULIC CIRCUITS THAT REQUIRE REMOTE CONTROLLED REVERSING FOUR-WAY VALVE ACTION.

### PRESSURE

MAXIMUM OIL OPERATING PRESSURE..... 3000 PSI  
MAXIMUM OIL TANK LINE PRESSURE (4-WAY)..... 1000 PSI  
MAXIMUM OIL DRAIN PRESSURE (PORT "T" ON 2-WAY - DO NOT PLUG)..... 80 PSI

### CONTROL AIR PRESSURE (LUBRICATED AIR PREFERRED)

RATED..... 90 PSI  
MINIMUM..... 50 PSI  
MAXIMUM..... 180 PSI

### AIR VOLUME

DISPLACEMENT VOLUME TO SHIFT VALVE..... 0.00008 FT<sup>3</sup>

SHIFT TIME (80 PSI AIR)..... APPROX. .02 SECOND



SPOOL TYPE	FLOW PATH						NOMINAL FLOW GPM
	P TO A	B TO T	P TO B	A TO T	CENTERED P TO T		
0	28	24	28	33	33		10
2	31	35	31	40			10
3	31	35	31	33			10
6	31	24	31	33			10
7	28	33	28	40			10
8	8	9	8	11	25		5
33	31	33	31	40			10

1. FIGURES IN THE PRESSURE DROP CHART GIVE APPROXIMATE PRESSURE DROPS ( $\Delta P$ ) WHEN PASSING FLOW OF 100 SSU FLUID(S), HAVING .865 SPECIFIC GRAVITY.

2. FOR ANY OTHER FLOW RATE ( $Q_1$ ), THE PRESSURE DROP ( $\Delta P_1$ ) WILL BE APPROXIMATELY:  
 $\Delta P_1 = \Delta P (Q_1/Q)^2$

3. FOR ANY OTHER VISCOSITY(S), THE PRESSURE DROP ( $\Delta P$ ) WILL CHANGE AS FOLLOWS:

OTHER VISCOSITY(S)	75	150	200	250	300	350	400
% OF ( $\Delta P$ ) (APPROX.)	93	111	119	126	132	137	141

4. FOR ANY OTHER SPECIFIC GRAVITY ( $G_1$ ), THE PRESSURE DROP ( $\Delta P$ ) WILL BE APPROXIMATELY:  
 $\Delta P_1 = \Delta P (G_1/G)$

\*SPECIFIC GRAVITY OF FLUID MAY BE OBTAINED FROM ITS PRODUCER. THE VALVE IS HIGHER FOR FIRE-RESISTANT FLUIDS THAN FOR OIL.

#### FLOW CAPACITY

RECOMMENDED OIL FLOW CAPACITY (FOR ALL SPOOLS ON 4-WAY MODELS. . . . . 10 GPM EXCEPT TYPE 8) WHICH IS . . . . . 5 GPM FOR ALL 2-WAY MODELS. . . . . 3 GPM

#### DRAIN

MAXIMUM PRESSURE ON 2-WAY DRAIN (PORT "T") IS 50 PSI. DO NOT PLUG DRAIN (PORT "T") OF 2-WAY VALVES. SEEPAGE FROM THE VALVE SIDE TO THE AIR PISTON SIDE IS DRAINED TO ATMOSPHERE.

#### FLUIDS AND SEALS

THE USE OF SYNTHETIC, FIRE-RESISTANT FLUIDS REQUIRES A VALVE WITH SPECIAL SEALS. ADD PREFIX "F3" TO MODEL NUMBER WHEN PHOSPHATE ESTERS OR CHLORINATED HYDROCARBONS ARE TO BE USED. WATER GLYCOL, WATER-IN-OIL EMULSIONS AND PETROLEUM OIL FLUIDS MAY BE USED WITH STANDARD SEALS.

#### FILTRATION (REQUIRED)

. . . . . 35 MICRON ABSOLUTE OR LESS

#### MOUNTING POSITIONS

NO-SPRING DETENTED TYPE VALVES MUST BE INSTALLED WITH THE LONGITUDINAL AXIS HORIZONTAL FOR GOOD MACHINE RELIABILITY. MOUNTING POSITION OF SPRING-CENTERED AND SPRING-OFFSET MODELS IS UNRESTRICTED.

CAUTION: SURGES OF OIL IN A COMMON TANK LINE SERVING THESE AND OTHER VALVES CAN BE OF SUFFICIENT MAGNITUDE TO CAUSE INADVERTENT SHIFTING OF THESE VALVES. THIS IS PARTICULARLY CRITICAL IN THE NO-SPRING DETENTED TYPE VALVES. SEPARATE TANK LINES OR A VENTED MANIFOLD WITH A CONTINUOUS DOWNWARD PATH TO TANK IS NECESSARY.

NOTE: WHEN USED AS OTHER THAN A NORMAL 4-WAY VALVE, CONSULT YOUR LOCAL SPERRY VICKERS REPRESENTATIVE.

#### SHIFTING ACTION

SPRING-CENTERED AND SPRING-OFFSET TYPE VALVES WILL BE SPRING-POSITIONED UNLESS AIR ACTUATOR IS PRESSURIZED CONTINUOUSLY. NO-SPRING DETENTED TYPE VALVES MAY BE AIR PRESSURE ACTUATED MOMENTARILY. WHEN THE AIR ACTUATORS OF THE NO-SPRING DETENTED MODELS ARE DE-PRESSURIZED, THE SPOOL REMAINS IN THE POSITION LAST ATTAINED PROVIDED THERE IS NO SHOCK, VIBRATION, UNUSUAL PRESSURE TRANSIENTS AND SPOOL AXIS IS HORIZONTAL.

NOTE: ANY SLIDING SPOOL VALVE, IF HELD SHIFTED UNDER PRESSURE FOR LONG PERIODS OF TIME, MAY STICK AND NOT SPRING RETURN DUE TO FLUID RESIDUE FORMATION AND, THEREFORE, SHOULD BE CYCLED PERIODICALLY TO PREVENT THIS FROM HAPPENING.

#### SUBPLATES AND BOLT KITS

VALVES, SUBPLATES, AND MOUNTING BOLTS MUST BE ORDERED SEPARATELY.

EXAMPLE: ONE (1) DG18S4-012C-50 VALVE

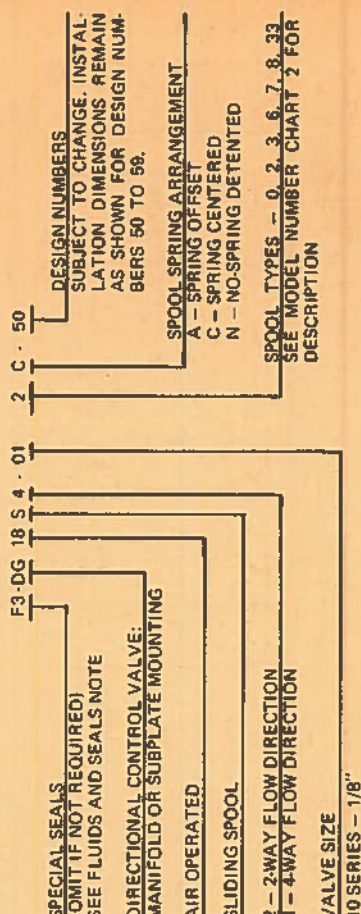
ONE (1) DG18M-01X-10 SUBPLATE

ONE (1) BKDG01-633 BOLT KIT

MAXIMUM RECOMMENDED MOUNTING BOLT TORQUE . . . . . 112 IN. LBS.

WHEN SUBPLATE IS NOT USED, A MACHINED PAD (AS INDICATED BY SHADED AREA ON FRONT PAGE) MUST BE PROVIDED FOR MOUNTING; PAD MUST BE FLAT WITHIN .0005 INCH AND SMOOTH, WITHIN .63 MICROINCH. MOUNTING BOLTS, WHEN PROVIDED BY CUSTOMER, SHOULD BE SAE GRADE 7, OR BETTER.

#### MODEL CODE



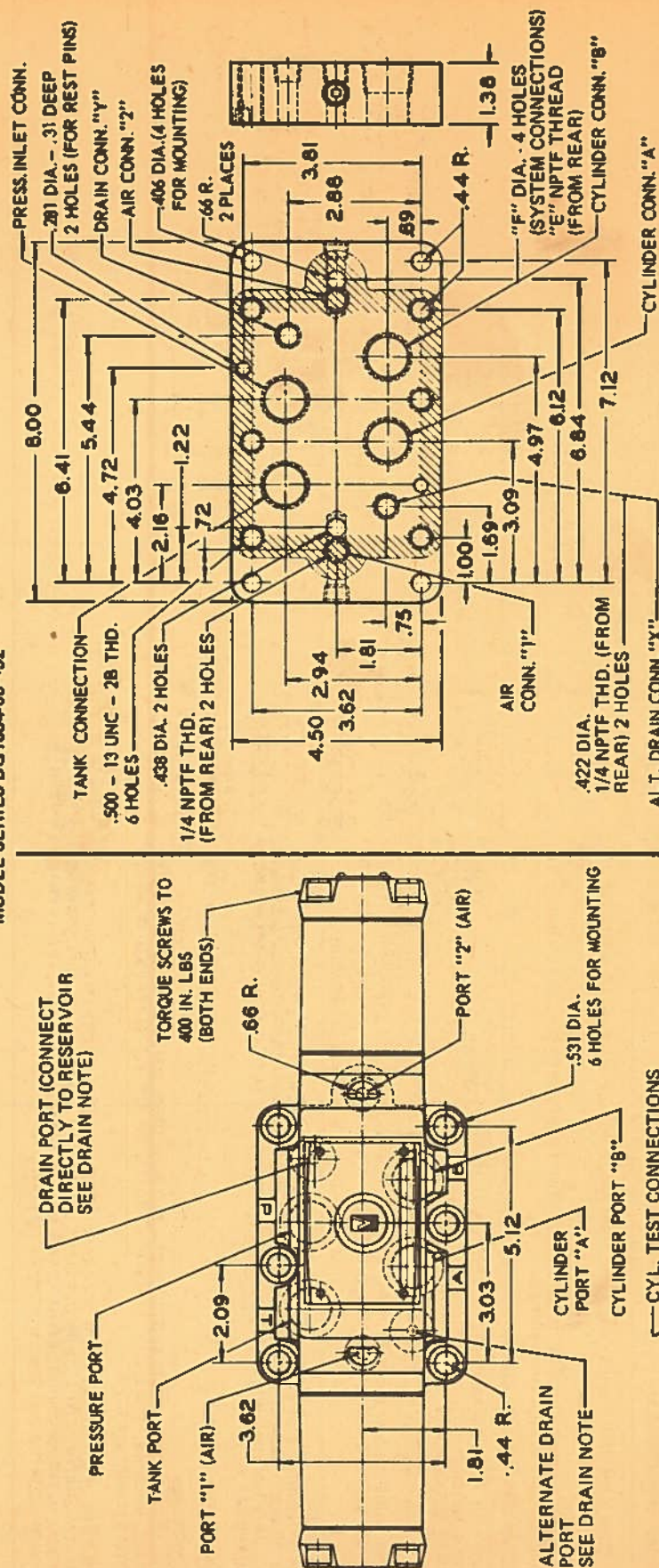
WEIGHT LBS. (APPROX.)

VALVES. . . . . 9  
 SUBPLATES. . . . . 5



**SPERRY-VICKERS AIR OPERATED FOUR-WAY DIRECTIONAL VALVES**

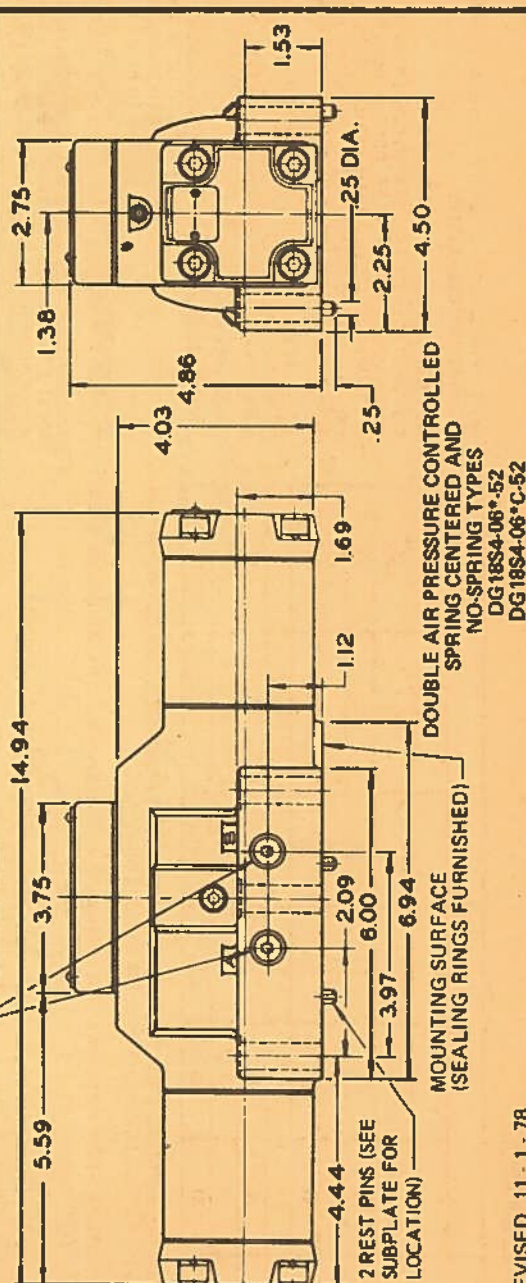
**SUBPLATE OR MANIFOLD MOUNTING  
MODEL SERIES DG18S4-06".52**



SUBPLATE MODEL NO.'S.	"E" NPTF THD.	"F" DIA.
DG18M-06-50	3/4	.906
DG18M-06X-50	1"	.969

SAE STRAIGHT THREADED  
SUBPLATES AVAILABLE ON  
REQUEST.

## MOUNTING SUBPLATES

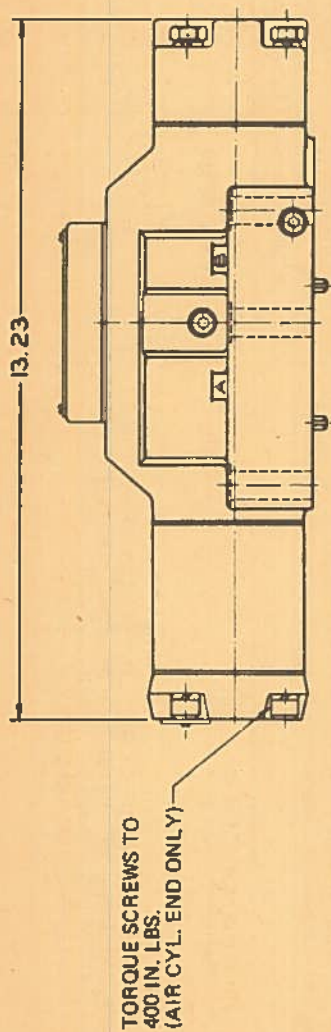


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SINGLE AIR PRESSURE CONTROLLED  
SPRING OFFSET TYPE  
DG18S4-08-A-52



SPRING OFFSET MODEL HAS INTERNAL SPRING  
WHICH RETURNS SPOOL WHEN AIR CONNECTION "1" IS EXHAUSTED.

STANDARD GRAPHICAL SYMBOLS FOR FLUID POWER DIAGRAMS



SINGLE AIR PRESSURE  
SPRING OFFSET MODELS



DOUBLE AIR PRESSURE  
SPRING CENTERED



DOUBLE AIR PRESSURE  
NO-SPRING MODELS



MODEL NUMBER			SPOOL TYPE	DIRECTION OF OIL FLOW FOR AIR PRESSURE CONTROL INDICATED	
DOUBLE AIR PRESSURE		SINGLE AIR PRESSURE		CENTER - APPLIES TO: 1. SPRING CENT. MODELS: AIR PRESSURE OFF 2. ALL OTHER MODELS AT CENTER CROSS OVER	AIR PRESS. → "2" AIR CONNECTION "1" → EXHAUST OR SPRING OFFSET
NO SPRING	SPRING CENTERED	SPRING OFFSET			
DG1854-060-52	DG1854-060C-52	DG1854-060A-52	OPEN CENTER ALL PORTS	PR., CYL. A & CYL. B → TANK	
	DG1854-061C-52		OPEN CENTER P & A	PR. & CYL. A → TANK CYL. B BLOCKED	PR. → CYL. B CYL. A → TANK
DG1854-062-52	DG1854-062C-52	DG1854-062A-52	CLOSED CENTER ALL PORTS	PR., CYL. A & CYL. B BLOCKED	
	DG1854-063C-52		CLOSED CENTER P & B	PR. & CYL. B BLOCKED CYL. A → TANK	
	DG1854-064C-52		TANDEM CLOSED CROSS OVER	PR. → TANK CYL. A & CYL. B BLOCKED	PR. → CYL. A CYL. B → TANK
DG1854-066-52	DG1854-066C-52	DG1854-066A-52	CLOSED CENTER P ONLY	PR. BLOCKED CYL. A & CYL. B → TANK	PR. → CYL. B CYL. A → TANK
	DG1854-068C-52		TANDEM OPEN CROSS OVER	PR. → TANK CYL. A & CYL. B BLOCKED	PR. → CYL. A CYL. B → TANK
DG1854-069-52	DG1854-069C-52	DG1854-069A-52	OPEN CENTER PARTIAL-ALL PORTS	PR., CYL. A & CYL. B → TANK	PR. → CYL. B CYL. A → TANK
	DG1854-0633C-52		CLOSED CENTER BLEED A & B	PR. BLOCKED CYL. A & CYL. B → TANK	

→ FULL FLOW  
X RESTRICTED FLOW

#### GENERAL USAGE

THESE NEW AIR-CONTROLLED VALVES ARE GENERALLY USED IN HYDRAULIC CIRCUITS THAT REQUIRE REMOTE CONTROLLED, FOUR-WAY VALVE ACTION.

#### RATINGS

MAXIMUM OIL OPERATING PRESSURE (SEE BELOW) ..... 3000 PSI  
MAXIMUM OIL TANK LINE PRESSURE ..... 3000 PSI

DRAIN PORTS (Y OR X) EXTERNAL ONLY. CONNECT DIRECTLY TO TANK THROUGH A SURGE FREE LINE SO BACK PRESSURE AT THIS DRAIN WILL NOT EXCEED 25 PSI.

CONTROL AIR PRESSURE - USE LUBRICATED AIR SUPPLY

RATED ..... 90 PSI  
MINIMUM ..... 40 PSI

DISPLACEMENT VOLUME (AIR) TO SHIFT VALVE ..... 0.0016 FT<sup>3</sup>

#### FLOW RATINGS

VALVE TYPE	SPOOL TYPE	RECOMMENDED FLOW CAPACITY	MAXIMUM FLOW WITHOUT MALFUNCTION
NO-SPRING	0, 2, 6 & 9	45 GPM	100 GPM AT 3000 PSI
	0, 4 & 8	45 GPM	80 GPM AT 3000 PSI
	2, 3, 6 & 33	45 GPM	100 GPM AT 3000 PSI
SPRING CENTERED	1	45 GPM	45 GPM AT 3000 PSI
	9	35 GPM	80 GPM AT 2000 PSI
	0	45 GPM	45 GPM AT 2000 PSI
SPRING OFFSET	2	45 GPM	60 GPM AT 3000 PSI
	6	35 GPM	100 GPM AT 2000 PSI
	9	35 GPM	35 GPM AT 3000 PSI
	9	35 GPM	60 GPM AT 2000 PSI



PSI PRESSURE DROP CHART - 45 GPM						
SPOOL TYPE	FLOW PATH					
	P TO A	B TO T	P TO B	A TO T	CENTERED P TO T	
0	16	30	17	24	16	
1	21	40	18	23	23	
2	30	38	22	28		
3	30	38	26	23		
4	60	61	45	60	43	
6	34	30	26	23		
8	19	49	15	42	39	
9	18	31	17	23	510	
33	30	38	30	38		

1. THE FIGURES SHOWN IN THE PRESSURE DROP CHART GIVE APPROXIMATE PRESSURE DROPS ( $\Delta P$ ) WHEN PASSING THE NOMINAL 45 GPM FLOW (Q) OF 100 SSU FLUID(S), HAVING .865 SPECIFIC GRAVITY.

2. FOR ANY OTHER FLOW RATE (Q1), THE PRESSURE DROP ( $\Delta P_1$ ), WILL BE APPROXIMATELY:  $\Delta P_1 = \Delta P(Q_1/Q)^2$

3. FOR ANY OTHER VISCOSITY(S), THE PRESSURE DROP ( $\Delta P$ ) WILL CHANGE AS FOLLOWS:

OTHER VISCOSITY(S)	75	150	200	250	300	350	400
% OF $\Delta P$ (APPROX.)	93	111	119	126	132	137	141

4. FOR ANY OTHER SPECIFIC GRAVITY (G1), \* THE PRESSURE DROP ( $\Delta P_1$ ) WILL BE APPROXIMATELY:  $\Delta P_1 = \Delta P(G_1/G)$

\*SPECIFIC GRAVITY OF FLUID MAY BE OBTAINED FROM ITS PRODUCER. FOR FIRE-RESISTANT FLUIDS THE VALUE IS HIGHER THAN FOR OIL.

**FLUIDS AND SEALS**  
THE USE OF SYNTHETIC, FIRE-RESISTANT FLUIDS REQUIRES A VALVE WITH SPECIAL SEALS. ADD PREFIX "F3" TO MODEL NUMBER WHEN PHOSPHATE ESTER TYPE FLUIDS OR ITS BLENDS ARE TO BE USED. WATER GLYCOL, WATER-IN-OIL EMULSION FLUIDS AND PETROLEUM OIL MAY BE USED WITH STANDARD SEALS. REFER TO DATA SHEET I-286-S (SECTION L) FOR HYDRAULIC OIL RECOMMENDATIONS.

**FILTRATION RECOMMENDED**  
OIL..... 25 MICRONS  
AIR..... 10 MICRONS

**MOUNTING POSITIONS**  
NO-SPRING MODELS MUST BE INSTALLED WITH LONGITUDINAL AXIS HORIZONTAL FOR A GOOD MACHINE RELIABILITY. SPRING OFFSET AND SPRING CENTERED MODELS ARE NOT RESTRICTED AS TO MOUNTING POSITION.

**NOTE:** NO-SPRING VALVES ARE NOT RECOMMENDED IN A CIRCUIT IN WHICH IT IS MANDATORY THAT THE VALVE REMAIN SHIFTED WITH AIR SUPPLY OFF OR PERFORMING OTHER AIR OPERATIONS. MACHINE VIBRATION, HEAT, IMPROPER CIRCUITRY, AND EXTERNALLY INTRODUCED SHOCKS MAY CAUSE THIS TYPE OF VALVE TO SHIFT PREMATURELY.

WHEN USED AS OTHER THAN A NORMAL 4-WAY VALVE, CONSULT YOUR VICKERS REPRESENTATIVE.

**WEIGHT (APPROX.)**  
VALVE..... 30.5 LBS.  
SUBPLATE..... 11 LBS.

SUBPLATES AND BOLTS: MOUNTING BOLTS ARE NOT INCLUDED WITH VALVES OR SUBPLATES. BOLTS SHOULD BE SAE GRADE 7, OR BETTER. ORDER BOLTS AND SUBPLATES SEPARATELY. NOTE: CENTER MOUNTING BOLTS (2) ARE OPTIONAL. ALL SIX BOLTS ARE RECOMMENDED FOR PRESSURE RANGE OF 2000 TO 3000 PSI FOR MAXIMUM SEAL LIFE.

EXAMPLE: ONE (1) DG18S4-064C-52  
ONE (1) DG18M-06-50 SUBPLATE  
ONE (1) BKDG06-635 MOUNTING BOLT KIT

MAXIMUM RECOMMENDED MOUNTING BOLT TORQUE..... 700 IN. LBS.

WHEN SUBPLATE IS NOT USED, A MACHINED PAD (AS INDICATED BY SHADED AREA ON FRONT PAGE), MUST BE PROVIDED FOR MOUNTING. PAD MUST BE FLAT WITHIN .0005 INCH AND SMOOTH WITHIN 63 MICROINCH. BOLTS SHOULD BE SAE GRADE 7, OR BETTER.

MODEL	PREVIOUS MODELS	INTERCHANGEABLE WITH THIS MODEL
DG18S4-06*11 VALVE		NO
DGSM-06-40 SUBPLATE		NO

#### MODEL CODE

F3 DG 18S4-06 \* \* - 52

DESIGN NUMBER

SUBJECT TO CHANGE. INSTALLATION DIMENSIONS REMAIN AS SHOWN FOR DESIGN NUMBERS 50 THROUGH 59.

SPOOL SPRING ARRANGEMENT

A - SPRING OFFSET

C - SPRING CENTERED (OMIT FOR NO-SPRING)

SPOOL TYPES 0, 1, 2, 3, 4, 6, 8, 9, 33.

REFER TO MODEL NUMBERS LISTED IN CHART ON PAGE 2.

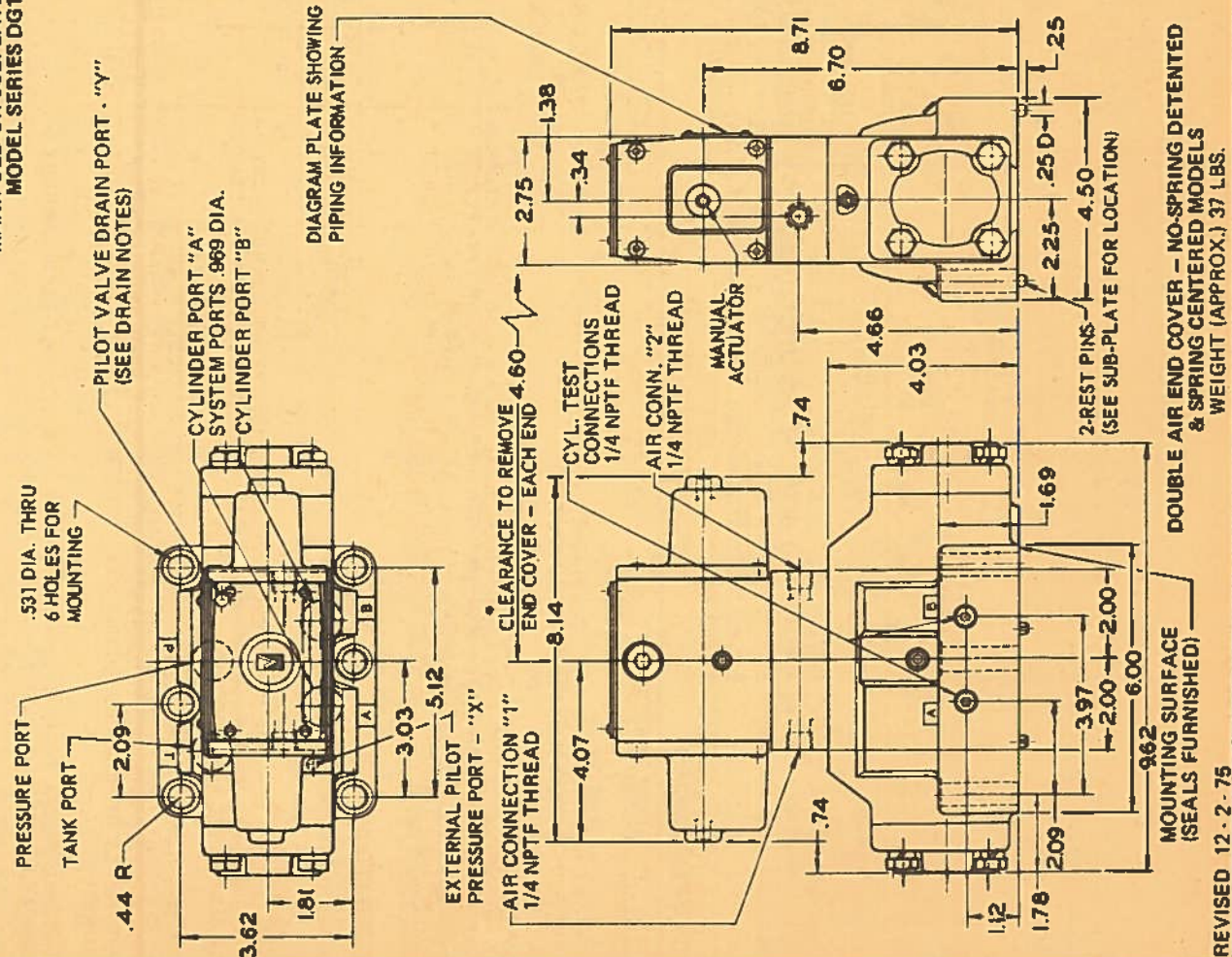
AIR OPERATED

SPECIAL SEALS (OMIT IF NOT REQ'D.)  
SEE FLUIDS AND SEALS NOTE.



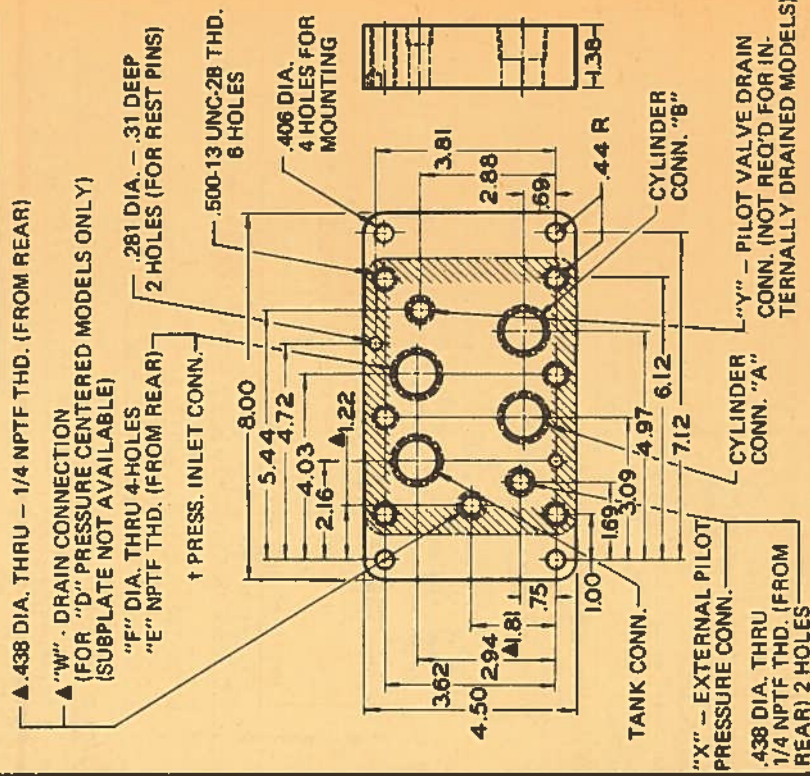
# **AIR CONTROLLED-HYDRAULIC PILOT OPERATED FOUR-WAY DIRECTIONAL VALVES**

MANIFOLD OR SUBPLATE MOUNTING  
MODEL SERIES DG19S4-06



## **MOUNTING SUBPLATES**

1-SEE NOTE PAGE 3 ON INTEGRAL CHECK VALVE MODEL PRESSURE PORT SIZING.



SUBPLATE MODEL NO'S.	"E" NPTF THD.	"F" DIA.	WEIGHT (APPROX.)
DGSM-06-50	3/4	.906	11 LBS.
DGSM-06X-50	1"	.969	

DGSM-06Y-50 FOR 1-1/4" NPTF THREADS ALSO AVAILABLE. SEE DRAWING 522590 SECTION L.

PIPE THREADED, SIDE CONNECTION SUBPLATES ALSO AVAILABLE WITH 3/4 AND 1" NPTF THDS.

▲ - SUBPLATES DGSM-06-50 AND DGSM-06X-50 HAVE NO "W" DRAIN CONNECTION.

SPERRY VICKERS  
TROY, MICHIGAN 48064

SPRING CENTERED, PRESSURE CENTERED, SPRING OFFSET & NO-SPRING DETENTED MODELS

TO 100 GPM & 3000 PSI

FOR 3/4" & 1" PIPING

MANIFOLD OR SUBPLATE MOUNTING

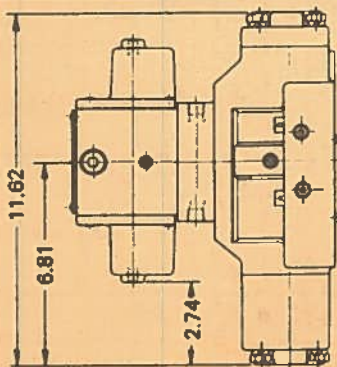
DWG. NO. 517905A

REVISED 12-2-75

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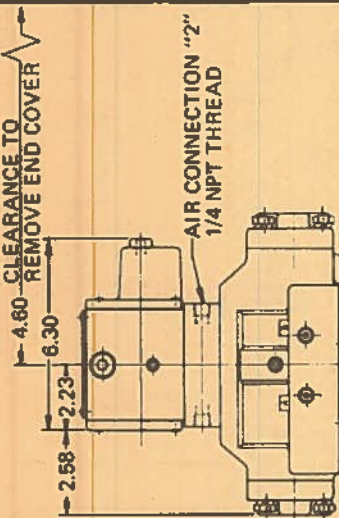


# DOUBLE AIR END COVER - PRESSURE CENTERED MODELS



WEIGHT (APPROX.) 43 LBS.

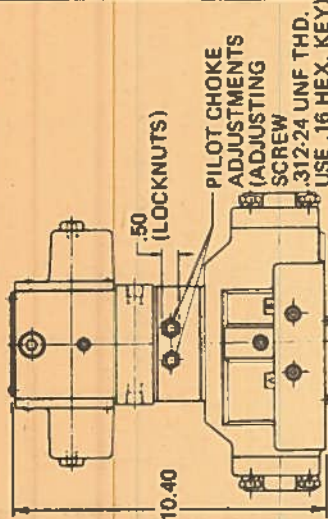
# SINGLE AIR END COVER - SPRING OFFSET MODELS



WEIGHT (APPROX.) 35 LBS.

SPRING OFFSET MODEL - WHEN AIR CONNECTION "2" IS EXHAUSTED, THE PILOT VALVE SPOOL IS RETURNED TO THE OFFSET POSITION BY A SPRING, BUT THE MAIN SPOOL IS RETURNED TO THE OFFSET POSITION BY PILOT PRESSURE.

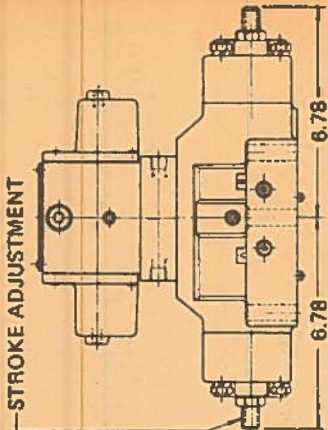
# MODELS WITH PILOT CHOKE ADJUSTMENTS



PILOT CHOKE ADJUSTED BY BACKING OFF LOCKNUTS AND TURNING ADJUSTING SCREWS OUT TO SLOW DOWN RATE OF SPOOL TRAVEL AND IN TO INCREASE THIS RATE. PILOT OIL FOR MODELS WITH THIS FEATURE SHOULD BE TAKEN FROM A SOURCE HAVING CONSTANT PRESSURE.

WEIGHT (APPROX.) 43 LBS.

# MODELS WITH STROKE ADJUSTMENTS



STROKE ADJUSTMENTS LIMIT MOVEMENT OF MAIN STAGESPOOL (BACKING OFF JAM NUT AND TURNING ADJUSTING SCREW IN SHORTENS SPOOL STROKE.)

WEIGHT (APPROX.) 47 LBS.

MODEL NUMBERS				SPOOL TYPE	DIRECTION OF OIL FLOW FOR VALVE SPOOL POSITIONS	TYPICAL GRAPHICAL SLIDING SPOOL SYMBOLS
DOUBLE AIR END COVER		SINGLE AIR END COVER				
PRESSURE CENTERED	NO-SPRING DETENTED	SPRING CENTERED	SPRING OFFSET			
DG19S4-060D-5*	DG19S4-060N-5*	DG19S4-060C-5*	DG19S4-060A-5*	"0" - OPEN CENTER ALL PORTS	PR., CYL. A & CYL. B → TANK	 SPRING CENTERED
DG19S4-061D-5*		DG19S4-061C-5*		"1" - OPEN CENTER P & A	PR. & CYL. A → TANK CYL. B BLOCKED	 SPRING CENTERED
DG19S4-062D-5*	DG19S4-062N-5*	DG19S4-062C-5*	DG19S4-062A-5*	"2" - CLOSED CENTER ALL PORTS	PR., CYL. A & CYL. B BLOCKED	 SPRING CENTERED
DG19S4-063D-5*		DG19S4-063C-5*		"3" - CLOSED CENTER P & B	PR. & CYL. B BLOCKED CYL. A → TANK	 SPRING CENTERED
DG19S4-064D-5*		DG19S4-064C-5*		"4" - TANDEM CLOSED CROSS OVER	PR. → TANK CYL. A & CYL. B BLOCKED	 SPRING CENTERED
DG19S4-066D-5*	DG19S4-066N-5*	DG19S4-066C-5*	DG19S4-066A-5*	"6" - CLOSED CENTER P ONLY	PR. BLOCKED CYL. A & CYL. B → TANK	 SPRING CENTERED
DG19S4-068D-5*		DG19S4-068C-5*		"8" - TANDEM OPEN CROSS OVER	PR. → TANK CYL. A & CYL. B BLOCKED	 SPRING CENTERED
DG19S4-069D-5*	DG19S4-069N-5*	DG19S4-069C-5*	DG19S4-069A-5*	"9" - OPEN CENTER PARTIAL - ALL PORTS	PR., CYL. A & CYL. B → TANK	 SPRING CENTERED
DG19S4-0633D-5*		DG19S4-0633C-5*		"33" - CLOSED CENTER BLEED A & B	PR. BLOCKED CYL. A & CYL. B → TANK	 SPRING CENTERED
				FREE FLOW → X RESTRICTED FLOW		
●SEE PILOT PRESSURE AND SHIFTING ACTION NOTES.						



## GENERAL USAGE

THESE VALVES ARE GENERALLY USED TO CONTROL THE DIRECTION OF FLOW IN A HYDRAULIC CIRCUIT. THIS, IN TURN, WOULD CONTROL THE DIRECTION OF MOVEMENT OF A WORK CYLINDER, OR THE ROTATION OF A FLUID MOTOR.

## RATINGS

MAXIMUM OPERATING PRESSURE (SEE BELOW)..... 3000 PSI

## MAXIMUM TANK LINE PRESSURE:

EXTERNAL DRAIN MODELS..... 3000 PSI

INTERNAL DRAIN MODELS..... 1000 PSI

## AIR OPERATING PRESSURE AND VOLUME:

RATED..... 90 PSI

MINIMUM..... 50 PSI

DISPLACEMENT AIR VOLUME TO SHIFT VALVE..... 0.00008 FT<sup>3</sup>

PILOT PRESSURE: 3000 PSI MAXIMUM. 75 PSI IS REQUIRED FOR ALL SPOOLS AT ZERO FLOW. FOR MAXIMUM FLOW WITHOUT MALFUNCTION, 75 PSI IS REQUIRED FOR OPEN CENTER SPOOLS, (0, 1, 4, 8 & 9) AND 150 PSI IS REQUIRED FOR CLOSED CENTER SPOOLS (2, 3, 6 & 33).

THE PILOT PRESSURE SOURCE IN MODELS TABULATED IS CONNECTED INTERNALLY WITH PRESSURE INLET CONNECTION AND IS EQUAL TO PRESSURE AT PRESSURE PORT. WITH MODELS HAVING PRESSURE OPEN OR PARTIALLY OPEN TO TANK AT CENTER POSITION, PILOT PRESSURE CAN BE ASSURED BY IMPOSING A BACK PRESSURE OF AT LEAST THE REQUIRED MINIMUM PILOT PRESSURE AT THE TANK OUTLET CONNECTION. (THIS BACK PRESSURE WILL BE PRESENT AT CYLINDER PORTS IF SPOOL IS "0", "1" OR "9" TYPE).

CAUTION: PRESSURE CENTERED MODELS REQUIRE A MINIMUM OF 150 PSI FOR PILOT PRESSURE.

WHEN PILOT PRESSURE FROM SEPARATE SOURCE (EXTERNAL) IS REQUIRED, AN EXTERNAL CONNECTION CAN BE PROVIDED. ORDER ACCORDING TO MODEL CODE.

## FLOW RATINGS

VALVE TYPE	SPOOL TYPE	RECOMMENDED FLOW CAPACITY	MAXIMUM FLOW WITHOUT MALFUNCTION
NO-SPRING DETENTED	0, 2, 6 & 9 ■	45 GPM	100 GPM AT 3000 PSI
	0, 4 & 8	45 GPM	80 GPM AT 3000 PSI
	2, 3, 6 & 33 ■	45 GPM	100 GPM AT 3000 PSI
SPRING CENTERED	1	45 GPM	45 GPM AT 3000 PSI
	9	35 GPM	80 GPM AT 2000 PSI
SPRING OFFSET	0, 2, 6 & 9 ■	45 GPM	45 GPM AT 3000 PSI
	0, 1, 2, 3, 4, 6, 8, 9 & 33 ■	45 GPM	100 GPM AT 3000 PSI
PRESSURE CENTERED		45 GPM	100 GPM AT 3000 PSI

■ AS SYSTEM FLOW INCREASES THE MINIMUM PILOT PRESSURE REQUIRED INCREASES. THESE SPOOLS WILL OPERATE SATISFACTORILY IN EXCESS OF 100 GPM WITH HIGHER PILOT PRESSURES.

PSI PRESSURE DROP CHART - 45 GPM

SPOOL TYPE	FLOW PATH					
	P TO A	B TO T	P TO B	A TO T	CENTERED P TO T	
0	16	30	17	24	16	
1	21	40	18	23	23	
2	30	38	22	28		
3	30	38	26	23		
4	60	61	45	60	43	
6	34	30	26	23		
8	19	49	15	42	39	
9	18	31	17	23		
33	30	38	30	38	510	

1. FIGURES IN PRESSURE DROP CHART GIVE APPROXIMATE PRESSURE DROPS (ΔP) WHEN PASSING 45 GPM FLOW (Q) OF 100 SUS FLUID(S) HAVING .865 SPECIFIC GRAVITY.

2. FOR ANY OTHER FLOW RATE (Q<sub>1</sub>), THE PRESSURE DROP (ΔP<sub>1</sub>) WILL BE APPROXIMATELY:  $\Delta P_1 = \Delta P(Q_1/Q)^2$

3. FOR ANY OTHER VISCOSITY (S), THE PRESSURE DROP (ΔP) WILL CHANGE AS FOLLOWS:

OTHER VISCOSITY (S)	75	150	200	250	300	350	400
% OF ΔP (APPROX.)	93	111	119	126	132	137	141

4. FOR ANY OTHER SPECIFIC GRAVITY (G<sub>1</sub>) ▲ THE PRESSURE DROP (ΔP<sub>1</sub>) WILL BE APPROXIMATELY:  $\Delta P_1 = \Delta P(G_1/G)$

▲ SPECIFIC GRAVITY OF FLUID MAY BE OBTAINED FROM ITS PRODUCER. THE VALUE IS HIGHER FOR FIRE-RESISTANT FLUIDS THAN FOR OIL.

## SHIFTING ACTION

SPRING CENTERED, PRESSURE CENTERED AND SPRING OFFSET MODELS MUST HAVE AIR ACTUATORS PRESSURIZED CONTINUOUSLY. NO SPRING DETENTED MODELS MAY BE AIR PRESSURE ACTUATED MOMENTARILY. PRESSURE CENTERED AND SPRING CENTERED MODELS RETURN THE VALVE SPOOL TO THE CENTER POSITION WHEN BOTH AIR ACTUATORS ARE DEPRESSURIZED. SPRING OFFSET MODELS RETURN TO THE OFFSET POSITION BY PILOT PRESSURE WHEN THE AIR ACTUATOR IS DEPRESSURIZED.

WHEN THE AIR ACTUATORS OF NO SPRING DETENTED MODELS ARE DEPRESSURIZED, THE PILOT AND MAIN SPOOL REMAIN IN THE LAST POSITION ATTAINED. PROVIDED THERE IS NO SHOCK, VIBRATION, UNUSUAL PRESSURE TRANSIENTS AND THE SPOOL AXIS IS HORIZONTAL. IF PILOT PRESSURE FAILS OR FALLS BELOW THE MINIMUM, THE MAIN SPOOL WILL SPRING CENTER (FLOW MUST BE WITHIN SPRING CENTERED RATINGS) AND CANNOT DRIFT TO REVERSAL OF FLOW (PILOT STAGE REMAINS IN DETENTED POSITION). CAUTION: BECAUSE OF THIS, THE FLOW CONDITIONS OF THE SPRING CENTERED POSITION MUST BE SELECTED WITH CARE. BOTH FOR THE EFFECT ON THE DIRECTION OF THE FLOW, AND THE PILOT PRESSURE. (THE "9" MAIN SPOOL WILL NOT INSURE SUFFICIENT PILOT PRESSURE IN THE CENTER POSITION.)

NOTE: ANY SLIDING SPOOL VALVE, IF HELD SHIFTED UNDER PRESSURE FOR LONG PERIODS OF TIME, MAY STICK AND NOT SPRING RETURN DUE TO FLUID RESIDUE FORMATION AND, THEREFORE, SHOULD BE CYCLED PERIODICALLY TO PREVENT THIS FROM HAPPENING.

WHEN USED AS OTHER THAN NORMAL 4-WAY, CONSULT YOUR SPERRY VICKERS REPRESENTATIVE.

NOTE: SURGES OF OIL IN A COMMON PILOT VALVE DRAIN LINE, SERVING THESE AND OTHER VALVES, CAN BE OF SUFFICIENT MAGNITUDE TO CAUSE INADVERTENT SHIFTING OF THESE VALVES. THIS IS PARTICULARLY CRITICAL IN THE NO-SPRING DETENTED TYPE VALVES. SEPARATE DRAIN LINES OR A VENTED DRAIN MANIFOLD WITH A CONTINUOUS DOWNWARD PATH TO TANK IS NECESSARY.

## DRAINS

### 1. PILOT VALVE DRAIN:

INTERNAL: TO PROVIDE MAXIMUM FLOW WITHOUT MALFUNCTION, PILOT PRESSURE OF INTERNALLY DRAINED VALVES MUST ALWAYS EXCEED TANK LINE BACK PRESSURE BY A MINIMUM OF 75 PSI FOR SPOOL TYPES "0", "1", "4", "8", "9" AND A MINIMUM OF 150 PSI FOR ALL OTHER SPOOLS. INTERNALLY DRAINED VALVES MAY BE USED ONLY WHEN SURGES IN THE TANK LINE CANNOT POSSIBLY OVERCOME THIS DIFFERENTIAL. INTERNAL DRAIN MAY BE USED WITH ALL VALVES. HOWEVER, AN INTEGRAL PRESURE PORT CHECK VALVE (SEE OPTIONAL CHECK VALVE NOTE) IS REQUIRED FOR VALVES USING AN INTERNAL PILOT SOURCE WITH AN OPEN CENTER SPOOL (0, 1, 4, 8 AND 9 TYPES) IN ORDER TO MAINTAIN PILOT PRESSURE. IF AN EXTERNAL PILOT SOURCE IS USED THEN AN INTEGRAL CHECK IS NOT REQUIRED. WHEN INTERNAL PILOT DRAIN IS REQUIRED, ORDER ACCORDING TO MODEL CODE. (PRESSURE CENTERED VALVES NOT INCLUDED).

EXTERNAL: WHEN THE POSSIBILITY OF PRESSURE SURGES IN THE TANK LINE EXISTS, EXTERNALLY DRAINED VALVES ARE RECOMMENDED. FOR EXTERNALLY DRAINED MODELS, THE PILOT VALVE DRAIN LINE MUST BE PIPED DIRECTLY TO TANK THROUGH A SURGE FREE LINE SO THERE WILL BE NO BACK PRESSURE AT THIS DRAIN. (REFERENCE CONNECTION "Y")

### 2. PRESSURE CENTERED DRAINS: (EXTERNAL ONLY)

EXTERNAL PILOT DRAIN NOTE ABOVE APPLIES TO "Y" DRAIN PORT. PRESSURE CENTERED "W" DRAIN CONNECTION MUST BE PIPED DIRECTLY TO TANK THROUGH A SURGE FREE LINE SO THERE WILL BE NO BACK PRESSURE AT THIS DRAIN.

517905A-2



FILTRATION RECOMMENDED: ..... 25 MICRONS

#### MOUNTING

POSITION: NO-SPRING DETENTED MODELS MUST BE INSTALLED WITH THE LONGITUDINAL AXIS HORIZONTAL FOR GOOD MACHINE RELIABILITY. MOUNTING POSITION OF PRESSURE CENTERED, SPRING OFFSET AND SPRING CENTERED MODELS IS UNRESTRICTED PROVIDED THAT THE PILOT PRESSURE SUPPLY IS MAINTAINED AS REQUIRED. (SPRING OFFSET VALVES DO NOT HAVE A SPRING IN THE MAIN SPOOL SECTION.)

#### SUBPLATES AND BOLT KITS

VALVES, SUBPLATES AND MOUNTING BOLTS MUST BE ORDERED SEPARATELY.

EXAMPLE:  
ONE (1) DG1854-062C-51 VALVE  
ONE (1) DGSM-06-50 SUBPLATE  
ONE (1) 8KDG06-635 BOLT KIT

MAXIMUM RECOMMENDED MOUNTING BOLT TORQUE: ..... 700 IN. LBS.

NOTE: CENTER MOUNTING BOLTS (2) ARE OPTIONAL. ALL SIX BOLTS ARE RECOMMENDED FOR PRESSURE RANGE OF 2000 TO 3000 PSI FOR MAXIMUM SEAL LIFE. WHEN SUBPLATE IS NOT USED, A MACHINED PAD (AS INDICATED BY SUBPLATE SHADED AREA) MUST BE PROVIDED FOR MOUNTING; PAD MUST BE FLAT WITHIN .0005 INCH AND SMOOTH WITHIN .63 MICROINCH. MOUNTING BOLTS, WHEN PROVIDED BY CUSTOMER, SHOULD BE SAE GRADE 7, OR BETTER.

#### NOTE

VALVE MODELS THAT INCORPORATE THE INTEGRAL CHECK (K OR R) MAY ONLY BE MOUNTED ON MANIFOLDS OR SUBPLATES WITH A MAXIMUM THRU PRESSURE PORT OF .906 DIA.

#### OPTIONAL FEATURES

PRESSURE CENTERED VALVES: THIS OPTION PROVIDES MORE POSITIVE CENTERING THROUGH GREATER FORCE. CENTERING SPRINGS ARE USED, IN ADDITION TO PILOT PRESSURE, TO ENSURE CENTERING (FLOW MUST BE WITHIN SPRING CENTERED RATINGS) SHOULD PILOT PRESSURE FAIL. SPRINGS CAN BE REMOVED BY THE USER IF NOT WANTED. PRESSURE CENTERED MODELS REQUIRE A MINIMUM OF 150 PSI FOR PILOT PRESSURE. THIS PRESSURE IS NOT AVAILABLE THROUGH USE OF AN INTEGRAL CHECK VALVE. (SEE DRAIN NOTE).

THE FOLLOWING CHART PROVIDES CENTERING TIMES FOR FAST RESPONSE PRESSURE CENTERED MODELS. CENTERING TIMES FOR PRESSURE CENTERED MODELS ARE SHOWN WITH VARIOUS PILOT PRESSURES.

#### MODEL CODE

SPECIAL SEALS (OMIT IF NOT REQ'D.)  
SEE FLUIDS AND SEALS NOTE

DIRECTIONAL CONTROL VALVE: GASKET MOUNTING, AIR CONTROLLED - HYDRAULIC OPERATED, SLIDING SPOOL, 4-WAY FLOW DIRECTION.

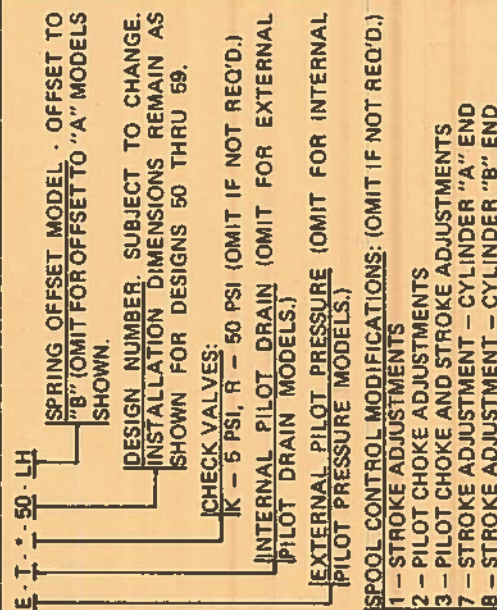
#### VALVE SIZE

SPOOL TYPES: 0, 1, 2, 3, 4, 6, 8, 9, 33. SEE MODEL NUMBER TABULATION ON PAGE 2 FOR DESCRIPTION.

#### SPOOL-SPRING ARRANGEMENT:

A - SPRING OFFSET  
C - SPRING CENTERED  
D - PRESSURE CENTERED  
N - NO-SPRING DETENTED

FAST RESPONSE (OMIT FOR STANDARD MODELS)



PRESSURE CENTERED VALVES (TYPICAL CENTERING TIMES IN SECONDS)		
PILOT PRESSURE (PSI)	"B" TO CENTER	"A" TO CENTER
150	.040	.075
250	.030	.068
500	.028	.040
1000	.026	.032
2000	.023	.028
3000	.020	.024

FAST RESPONSE: SHIFT TIME (CONVENTIONAL CENTERING). USE OF THIS OPTION DECREASES THE SHIFT TIME AND INCREASES THE SYSTEM SHOCK GENERATION. AVAILABLE BY ADDING SYMBOL "X" TO MODEL NUMBER. EXAMPLE: DG1854-062CX-51

#### TYPICAL SHIFT TIMES IN SECONDS

PILOT PRESSURE (PSI)	STANDARD CENTER TO "A" OR "B"	FAST RESPONSE CENTER TO "A" OR "B"
500	.080	.040
1000	.040	.030
2000	.030	.020
3000	.025	.020

ALL SPRING CENTERED MODELS REQUIRE APPROXIMATELY .075 OF A SECOND TO CENTER FROM EITHER SIDE.

"X" BECAUSE OF THE HIGH DRAIN LINE PRESSURE TRANSIENTS GENERATED DURING SHIFTING. USE OF THE FAST RESPONSE OPTION IS NOT RECOMMENDED FOR PILOT PRESSURES EXCEEDING 2000 PSI.

INTEGRAL CHECK VALVES (IN PRESSURE PORT): FOR PILOT PRESSURE - USE CHECK VALVE WITH 50 PSI CRACKING PRESSURE (R). IF INTERNAL PILOT VALVE DRAIN IS USED, THE PILOT PRESSURE IS DETERMINED FROM THE PRESSURE-DROP THROUGH THE CHECK VALVE PLUS THE TOTAL PRESSURE DROP THROUGH THE VALVE (P → T) ON CENTER. IF EXTERNAL PILOT VALVE DRAIN IS USED, THE PILOT PRESSURE IS DETERMINED FROM THE PRESSURE DROP THROUGH THE CHECK VALVE PLUS THE TOTAL PRESSURE DROP THROUGH THE VALVE (P → T) PLUS OTHER PRESSURE DROPS DOWNSTREAM OF THE VALVE. FOR OTHER USES - A CHECK VALVE WITH 5 PSI CRACKING PRESSURE (K) CAN BE USED TO PREVENT REVERSE FLOW OTHER THAN LEAKAGE, SUCH AS IN CLAMP CIRCUITS, AND WHERE THE CHECK IS NOT REQUIRED FOR PILOT PRESSURE.

NOTE: VALVES WITH THE INTEGRAL CHECK FEATURE "K" OR "R" ARE LIMITED FOR USE WITH ONLY THE 3/4" NPTF THREADED SUB-PLATE (DGSM-06-50) WHERE THE THRU HOLES DO NOT EXCEED .906 DIA.

THE PRESSURE PORT IN THE CUSTOMERS MANIFOLD FOR THE SAME MODELS WITH THE FEATURE "K" OR "R" MUST ALSO BE LIMITED TO A MAXIMUM SIZE OF .906 DIA.

FLUIDS AND SEALS: THE USE OF SYNTHETIC, FIRE-RESISTANT FLUIDS REQUIRES A VALVE WITH SPECIAL SEALS. ADD PREFIX "F3" TO MODEL NUMBER WHEN PHOSPHATE ESTER TYPE FLUIDS OR ITS BLENDS ARE TO BE USED. WATER GLYCOL, WATER-IN-OIL EMULSIONS AND PETROLEUM OIL FLUIDS MAY BE USED WITH STANDARD SEALS. REFER TO DATA SHEET 1-286-S (SECTION L) FOR HYDRAULIC FLUID AND TEMPERATURE RECOMMENDATIONS.



**GENERAL DATA**

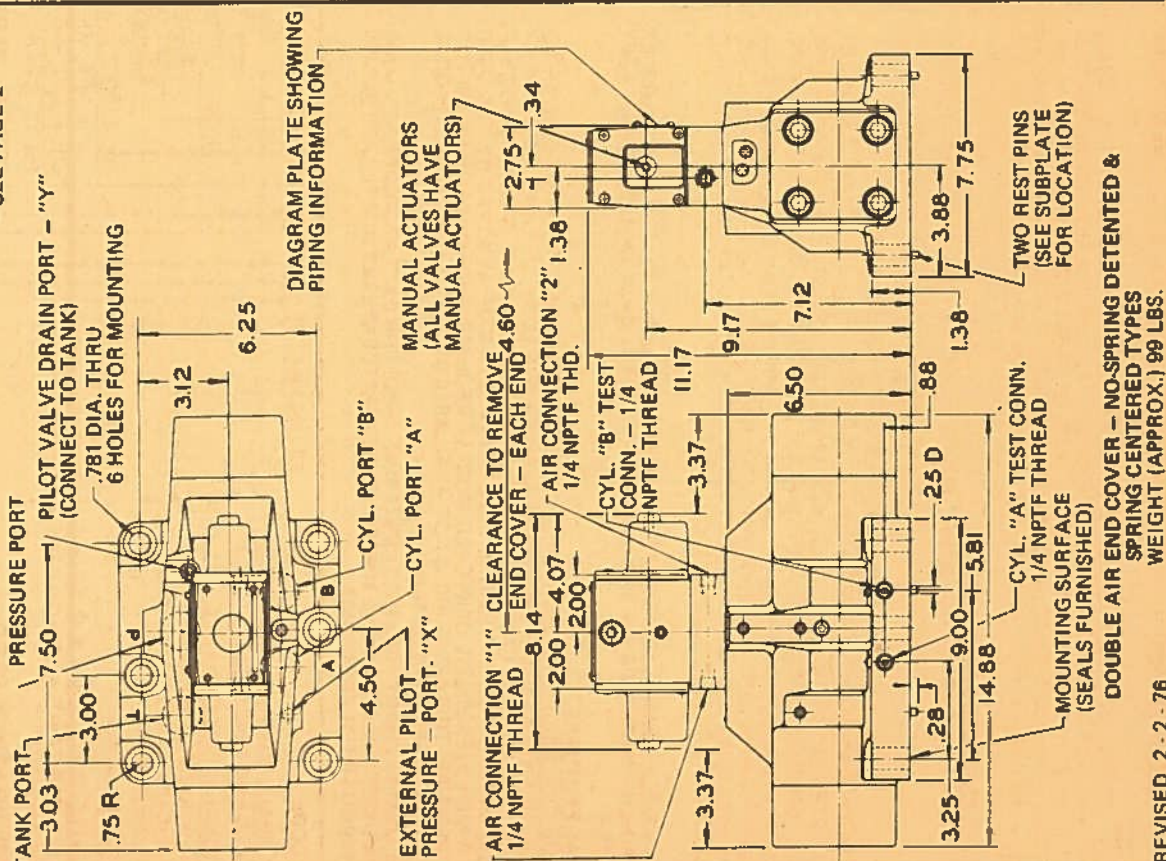
THESE VALVES ARE GENERALLY USED TO CONTROL THE DIRECTION OF FLOW IN A HYDRAULIC CIRCUIT. THIS, IN TURN, WOULD CONTROL THE DIRECTION OF MOVEMENT OF A WORK CYLINDER, OR THE ROTATION OF A FLUID MOTOR.

SYSTEM PRESSURE AND FLOW ..... 3000 PSI

MAXIMUM OPERATING PRESSURE ..... 125 GPM

RECOMMENDED FLOW AT 3000 PSI

SEE PAGE 2



DOUBLE AIR END COVER - NO-SPRING DETENTED &  
SPRING CENTERED TYPES  
WEIGHT (APPROX.) 99 LBS.

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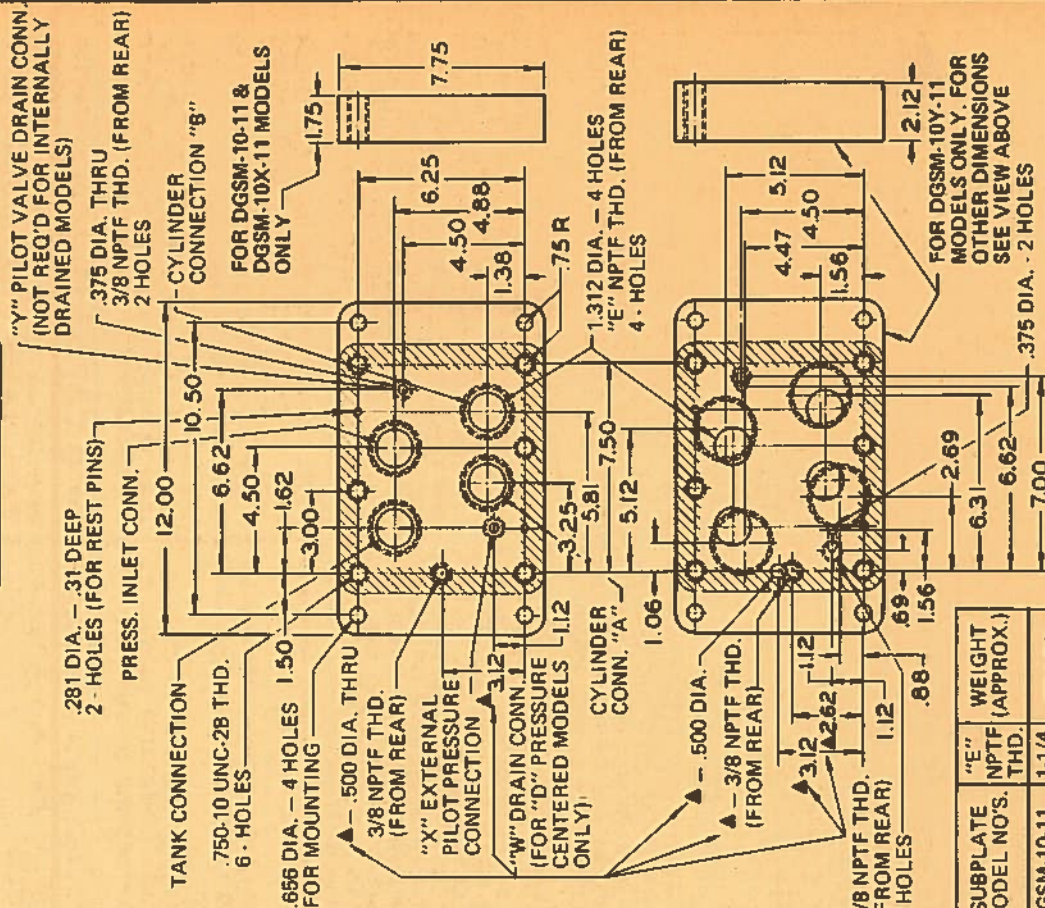
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**AIR CONTROLLED-HYDRAULIC  
PILOT OPERATED  
FOUR-WAY DIRECTIONAL VALVES**



**MANIFOLD OR SUBPLATE MOUNTING  
MODEL SERIES DG19S4-10**

## MOUNTING SUBPLATES

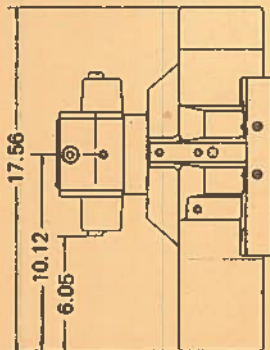


SUBPLATE MODEL NO.'S.	"E" NPTF THD.	WEIGHT (APPROX.)
DGSM-10-11	1-1/4	38 LBS.
DGSM-10X-11	1-1/2	46 BS.
DGSM-10Y-11	2"	46 BS.

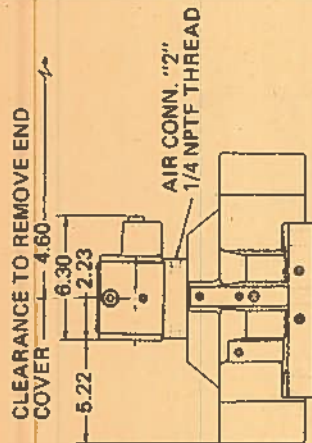
▲ "W" DRAIN CONNECTION NOT AVAILABLE IN SUBPLATES.

518005



DOUBLE AIR END COVER -  
PRESSURE CENTERED MODELS

WEIGHT (APPROX.) 105 LBS.

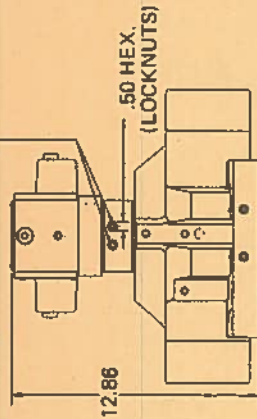
SINGLE AIR END COVER -  
SPRING OFFSET MODELS

SPRING OFFSET MODEL - WHEN AIR CONNECTION "2" IS EXHAUSTED, THE PILOT VALVE SPOOL IS RETURNED TO THE OFF-SET POSITION BY A SPRING, BUT THE MAIN SPOOL IS RETURNED TO THE OFFSET POSITION BY PILOT PRESSURE.

WEIGHT (APPROX.) 97 LBS.

## MODELS WITH PILOT CHOKE ADJUSTMENTS

PILOT CHOKE ADJUSTMENTS  
(ADJUSTING SCREW .312-24  
UNF THD. USE .16 HEX. KEY)



PILOT CHOKE ADJUSTED BY BACKING OFF LOCKNUTS AND TURNING ADJUSTING SCREWS OUT TO SLOW DOWN RATE OF SPOOL TRAVEL AND IN TO INCREASE THIS RATE. PILOT OIL FOR MODELS WITH THIS FEATURE SHOULD BE TAKEN FROM A SOURCE HAVING CONSTANT PRESSURE.

WEIGHT (APPROX.) 105 LBS.

## MODEL NUMBERS

## DIRECTION OF OIL FLOW FOR VALVE SPOOL POSITIONS

DOUBLE AIR END COVER			SINGLE AIR END COVER	SPOOL TYPE	CENTER - APPLIES TO 1. SPRING OR PR. CENT. MODELS: AIR PRESS. OFF 2. ALL OTHER MODELS AT CENTER CROSS OVER	AIR PRESS. — "1" AIR CONNECTION "2" — EXHAUST OR SPRING OFFSET	AIR PRESS. — "2" AIR CONNECTION "1" — EXHAUST	TYPICAL GRAPHICAL SLIDING SPOOL SYMBOLS
PRESSURE CENTERED	NO-SPRING DETENTED	SPRING CENTERED						
DG19S4-100D-50	DG19S4-100N-50	DG19S4-100C-50	DG19S4-100A-50	"0" - OPEN CENTER ALL PORTS	PR., CYL. A & CYL. B TANK			
DG19S4-102D-50	DG19S4-102N-50	DG19S4-102C-50	DG19S4-102A-50	"2" - CLOSED CENTER ALL PORTS	PR., CYL. A & CYL. B BLOCKED	PR. — CYL. A CYL. B — TANK	PR. — CYL. B CYL. A — TANK	
DG19S4-103D-50		DG19S4-103C-50		"3" - CLOSED CENTER P & B	PR. & CYL. B BLOCKED CYL. A — TANK			
DG19S4-104D-50		DG19S4-104C-50		"4" - TANDEM CLOSED CROSS OVER	PR. — TANK CYL. A & CYL. B BLOCKED	PR. — CYL. B CYL. A — TANK	PR. — CYL. A CYL. B — TANK	
DG19S4-106D-50	DG19S4-106N-50	DG19S4-106C-50	DG19S4-106A-50	"6" - CLOSED CENTER P ONLY	PR. BLOCKED CYL. A & CYL. B — TANK	PR. — CYL. A CYL. B — TANK	PR. — CYL. B CYL. A — TANK	
DG19S4-108D-50		DG19S4-108C-50		"8" - TANDEM OPEN CROSS OVER	PR. — TANK CYL. A & CYL. B BLOCKED	PR. — CYL. B CYL. A — TANK	PR. — CYL. A CYL. B — TANK	
DG19S4-109D-50	DG19S4-109N-50	DG19S4-109C-50	DG19S4-109A-50	"9" - OPEN CENTER PARTIAL - ALL PORTS	PR., CYL. A & CYL. B TANK	PR. — CYL. A CYL. B — TANK	PR. — CYL. B CYL. A — TANK	
DG19S4-1033D-50		DG19S4-1033C-50		"33" - CLOSED CENTER BLEED A & B	PR. BLOCKED CYL. A & CYL. B — TANK	PR. — CYL. A CYL. B — TANK	PR. — CYL. B CYL. A — TANK	
▲SEE PILOT PRESSURE AND SHIFTING ACTION NOTES.								
— FULL FLOW — RESTRICTED FLOW								

518005-1



# **MAXIMUM TANK LINE PRESSURE:**

EXTERNAL DRAIN MODELS..... 3000 PSI  
INTERNAL DRAIN MODELS..... 1000 PSI

## **AIR OPERATING PRESSURE AND VOLUME:**

RATED..... 90 PSI  
MINIMUM..... 50 PSI  
DISPLACEMENT AIR VOLUME TO SHIFT VALVE..... 0.0008 FT<sup>3</sup>  
PILOT PRESSURE (MAXIMUM)..... 3000 PSI

SPOOL TYPE	FLOW GPM	MINIMUM PILOT PRESSURE PSI ▲		
		SHIFTING P → A	SHIFTING P → B	ALL OTHER MODELS
ALL SPOOLS	0	75	200	75
	250	75	200	75
	250	150	400	150

## ▲ SEE DRAIN NOTES.

● ON PRESSURE CENTERED MODELS END COVERS CANNOT BE INTERCHANGED. PILOT PRESSURE IS NOT AVAILABLE THROUGH USE OF INTEGRAL CHECK VALVE.

NOTE: THE ABOVE CHART IS BASED ON INTERNALLY PILOTED AND EXTERNALLY DRAINED MODELS IN WHICH THE PILOT PRESSURE IS EQUAL TO THE PRESSURE AT THE VALVE PRESSURE PORT. WITH MODELS HAVING PRESSURE OPEN OR PARTIALLY OPEN TO TANK AT CENTER POSITION, PILOT PRESSURE CAN BE ASSURED BY IMPOSING A BACK PRESSURE OF AT LEAST THE REQUIRED MINIMUM PILOT PRESSURE AT THE TANK OUTLET CONNECTION (THIS BACK PRESSURE WILL BE PRESENT AT CYLINDER PORTS IF SPOOL IS "0" OR "9" TYPE).

WHEN PILOT PRESSURE FROM SEPARATE SOURCE (EXTERNAL) IS REQUIRED, AN EXTERNAL CONNECTION CAN BE PROVIDED. ORDER ACCORDING TO MODEL CODE.

## **FLOW RATINGS**

VALVE TYPE	SPOOL TYPE	RECOMMENDED FLOW CAPACITY	MAXIMUM FLOW WITHOUT MALFUNCTION
NO-SPRING DETENTED	0, 2, 6 & 9 ■	125 GPM	250 GPM AT 3000 PSI
	0, 4 & 8 ■		
	2, 3, 6 & 33 ■		
SPRING CENTERED	9	85 GPM	85 GPM AT 3000 PSI 125 GPM AT 2000 PSI 150 GPM AT 1000 PSI
	0, 2, 6 & 9 ■		
	0, 2, 3, 4, 6, 8 & 33 ■		
SPRING OFFSET	0, 2, 6 & 9 ■	125 GPM	250 GPM AT 3000 PSI
PRESSURE CENTERED	0, 2, 3, 4, 6, 8 & 33 ■		

■ AS SYSTEM FLOW INCREASES THE MINIMUM PILOT PRESSURE REQUIRED INCREASES. THESE SPOOLS WILL OPERATE SATISFACTORILY IN EXCESS OF 250 GPM WITH HIGHER PILOT PRESSURES.

## **PSI PRESSURE DROP CHART**

SPOOL TYPE	FLOW PATH				
	P TO A	B TO T	P TO B	A TO T	CENTERED P TO T
0	45	73	51	65	55
2	55	83	55	76	
3	55	83	55	48	
4	80	150	80	170	80
6	55	75	55	46	
8	62	122	63	138	80
9	46	75	50	70	400
33	55	83	55	76	

1. FIGURES IN PRESSURE DROP CHART GIVE APPROXIMATE PRESSURE DROPS (ΔP) WHEN PASSING 100 GPM FLOW (Q) OF 100 SUS FLUID(S) HAVING .865 SPECIFIC

# **GRAVITY.**

2. FOR ANY OTHER FLOW RATE (Q<sub>1</sub>), THE PRESSURE DROP (ΔP<sub>1</sub>) WILL BE APPROXIMATELY: ΔP<sub>1</sub> = ΔP(Q<sub>1</sub>/Q)<sup>2</sup>

3. FOR ANY OTHER VISCOSITY(S), THE PRESSURE DROP (ΔP) WILL CHANGE AS FOLLOWS:

OTHER VISCOSITY(S)	75	150	200	250	300	350	400
% OF ΔP (APPROX.)	93	111	119	126	132	137	141

4. FOR ANY OTHER SPECIFIC GRAVITY (G<sub>1</sub>)<sup>●</sup>, THE PRESSURE DROP (ΔP<sub>1</sub>) WILL BE APPROXIMATELY: ΔP<sub>1</sub> = ΔP(G<sub>1</sub>/G)

● SPECIFIC GRAVITY OF FLUID MAY BE OBTAINED FROM ITS PRODUCER. THE VALVE IS HIGHER FOR FIRE RESISTANT FLUIDS THAN FOR OIL.

## **SHIFTING ACTION**

SPRING CENTERED, PRESSURE CENTERED AND SPRING OFFSET MODELS MUST HAVE AIR ACTUATORS PRESSURIZED CONTINUOUSLY. NO SPRING DETENTED MODELS MAY BE AIR PRESSURE ACTUATED MOMENTARILY. PRESSURE CENTERED AND SPRING CENTERED MODELS RETURN THE VALVE SPOOL TO THE CENTER POSITION WHEN BOTH AIR ACTUATORS ARE DEPRESSURIZED. SPRING OFFSET MODELS RETURN TO THE OFFSET POSITION BY PILOT PRESSURE WHEN THE AIR ACTUATOR IS DEPRESSURIZED. WHEN THE AIR ACTUATORS OF NO SPRING DETENTED MODELS ARE DEPRESSURIZED, THE PILOT AND MAIN SPOOL REMAIN IN THE LAST POSITION ATTAINED, PROVIDED THERE IS NO SHOCK, VIBRATION, UNUSUAL PRESSURE TRANSIENTS AND THE SPOOL AXIS IS HORIZONTAL. IF PILOT PRESSURE FAILS OR FALLS BELOW THE MINIMUM, THE MAIN SPOOL WILL SPRING CENTER (FLOW MUST BE WITHIN SPRING CENTERED RATINGS) AND CANNOT DRIFT TO REVERSAL OF FLOW (PILOT STAGE REMAINS IN DETENTED POSITION). CAUTION: BECAUSE OF THIS, THE FLOW CONDITIONS OF THE SPRING CENTERED POSITION MUST BE SELECTED WITH CARE, BOTH FOR THE EFFECT ON THE DIRECTION OF THE FLOW AND THE PILOT PRESSURE. (THE "9" MAIN SPOOL WILL NOT INSURE SUFFICIENT PILOT PRESSURE IN THE CENTER POSITION.)

## **NOTE:**

ANY SLIDING SPOOL VALVE, IF HELD SHIFTED UNDER PRESSURE FOR LONG PERIODS OF TIME, MAY STICK AND NOT SPRING RETURN DUE TO FLUID RESIDUE FORMATION AND, THEREFORE, SHOULD BE CYCLED PERIODICALLY TO PREVENT THIS FROM HAPPENING.

## **DRAINS**

### 1. PILOT VALVE DRAIN:

INTERNAL: TO PROVIDE MAXIMUM FLOW WITHOUT MALFUNCTION, PILOT PRESSURE OF INTERNALLY DRAINED VALVES MUST ALWAYS EXCEED TANK LINE BACK PRESSURE BY A MINIMUM OF 75 PSI FOR SPOOL TYPES "0", "4", "8" & "9" AND A MINIMUM OF 150 PSI FOR ALL OTHER SPOOLS. INTERNALLY DRAINED VALVES MAY BE USED ONLY WHEN SURGES IN THE TANK LINE CANNOT POSSIBLY OVERCOME THIS DIFFERENTIAL. INTERNAL DRAIN MAY BE USED WITH ALL VALVES, HOWEVER, AN INTEGRAL PRESSURE PORT CHECK VALVE (SEE OPTIONAL CHECK VALVE NOTE) IS REQUIRED FOR VALVES USING AN INTERNAL PILOT SOURCE WITH AN OPEN CENTER SPOOL (0, 4, 8 AND 9 TYPES) IN ORDER TO MAINTAIN PILOT PRESSURE. IF AN EXTERNAL PILOT SOURCE IS USED THEN AN INTEGRAL CHECK IS NOT REQUIRED. WHEN INTERNAL PILOT DRAIN IS REQUIRED, ORDER ACCORDING TO MODEL CODE. (PRESSURE CENTERED VALVES NOT INCLUDED).

EXTERNAL: WHEN THE POSSIBILITY OF PRESSURE SURGES IN THE TANK LINE EXISTS, EXTERNALLY DRAINED VALVES ARE RECOMMENDED. FOR EXTERNALLY DRAINED MODELS, THE PILOT VALVE DRAIN LINE MUST BE PIPED DIRECTLY TO TANK THROUGH A SURGE FREE LINE SO THERE WILL BE NO BACK PRESSURE AT THIS DRAIN. (REFERENCE CONNECTION "Y".)

2. PRESSURE CENTERED DRAIN: (EXTERNAL ONLY)

EXTERNAL PILOT DRAIN NOTE ABOVE APPLIES TO "Y" DRAIN PORT.

PRESSURE CENTERED "W" DRAIN CONNECTION MUST BE PIPED DIRECTLY TO TANK THROUGH A SURGE FREE LINE SO THERE WILL BE NO BACK PRESSURE AT THIS DRAIN. FILTRATION RECOMMENDED. . . . . 35 MICRON ABSOLUTE (10 MICRON NOMINAL)

## **MOUNTING**

POSITION: NO SPRING DETENTED MODELS MUST BE INSTALLED WITH THE LONGITUDINAL AXIS HORIZONTAL FOR GOOD MACHINE RELIABILITY. MOUNTING POSITION OF PRESSURE CENTERED, SPRING OFFSET AND SPRING CENTERED MODELS IS UN-



RESTRICTED PROVIDED THAT THE PILOT PRESSURE SUPPLY IS MAINTAINED AS REQUIRED. (SPRING OFFSET VALVES DO NOT HAVE A SPRING IN THE MAIN SPOOL SECTION.)

NOTE: SURGES OF OIL IN A COMMON PILOT VALVE DRAIN LINE, SERVING THESE AND OTHER VALVES, CAN BE OF SUFFICIENT MAGNITUDE TO CAUSE INADVERTENT SHIFTING OF THESE VALVES. THIS IS PARTICULARLY CRITICAL IN THE NO-SPRING DETENTED TYPE VALVES. SEPARATE DRAIN LINES OR A VENTED DRAIN MANIFOLD WITH A CONTINUOUS DOWNWARD PATH TO TANK IS NECESSARY.

WHEN USED AS OTHER THAN A NORMAL 4-WAY VALVE, CONSULT YOUR SPERRY VICKERS REPRESENTATIVE.

#### OPTIONAL FEATURES

**PRESSURE CENTERED VALVES:** THIS OPTION PROVIDES MORE POSITIVE CENTERING THROUGH GREATER FORCE. CENTERING SPRINGS ARE USED. IN ADDITION TO PILOT PRESSURE, TO ENSURE CENTERING (FLOW MUST BE WITHIN THE SPRING CENTERED RATINGS) SHOULD PILOT PRESSURE FAIL. SPRINGS CAN BE REMOVED BY THE USER IF NOT WANTED. PILOT PRESSURE IS NOT AVAILABLE THROUGH USE OF AN INTEGRAL CHECK VALVE. (SEE DRAIN AND PILOT PRESSURE NOTES.)

THE FOLLOWING CHART PROVIDES CENTERING TIMES FOR PRESSURE CENTERED AND CONVENTIONAL SPRING CENTERED MODELS. CENTERING TIMES FOR PRESSURE CENTERED MODELS ARE SHOWN WITH VARIOUS PILOT PRESSURES.

MODEL	PRESSURE CENTERED VALVES (TYPICAL CENTERING TIMES IN SECONDS)		
	PILOT PRESSURE (PSI)	"B" TO CENTER	"A" TO CENTER
DA	150	.104	.144
	250	.080	.108
	1000	.056	.064
DB	1000	.064	.085
	2000	.060	.080
D	2000	.065	.092
	3000	.060	.076

CONVENTIONAL SPRING CENTERED MODELS REQUIRE APPROXIMATELY .175 OF A SECOND TO CENTER FROM EITHER SIDE.

NOTE: ABOVE FIGURES FOR "DA" MODEL ARE WITH FAST RESPONSE OPTION. FAST RESPONSE OPTION NOT AVAILABLE WITH "D" OR "DB" MODELS.

CHOOSING THE PROPER MODEL FOR PILOT PRESSURES ENCOUNTERED WILL ASSURE CENTERING WITH MAXIMUM SPEED.

INTEGRAL CHECK VALVES (IN PRESSURE PORT): FOR PILOT PRESSURE - 50 PSI CRACKING PRESSURE. FOR PREVENTING REVERSE FLOW OTHER THAN LEAKAGE IN CLAMP CIRCUITS - 5 PSI CRACKING PRESSURE. ORDER ACCORDING TO MODEL CODE.

FAST RESPONSE: USE OF THIS OPTION DECREASES THE SHIFT TIME APPROXIMATELY 60 PERCENT. HOWEVER, SYSTEM SHOCK GENERATION IS CORRESPONDINGLY INCREASED. NOT RECOMMENDED FOR PILOT PRESSURES EXCEEDING 2000 PSI.

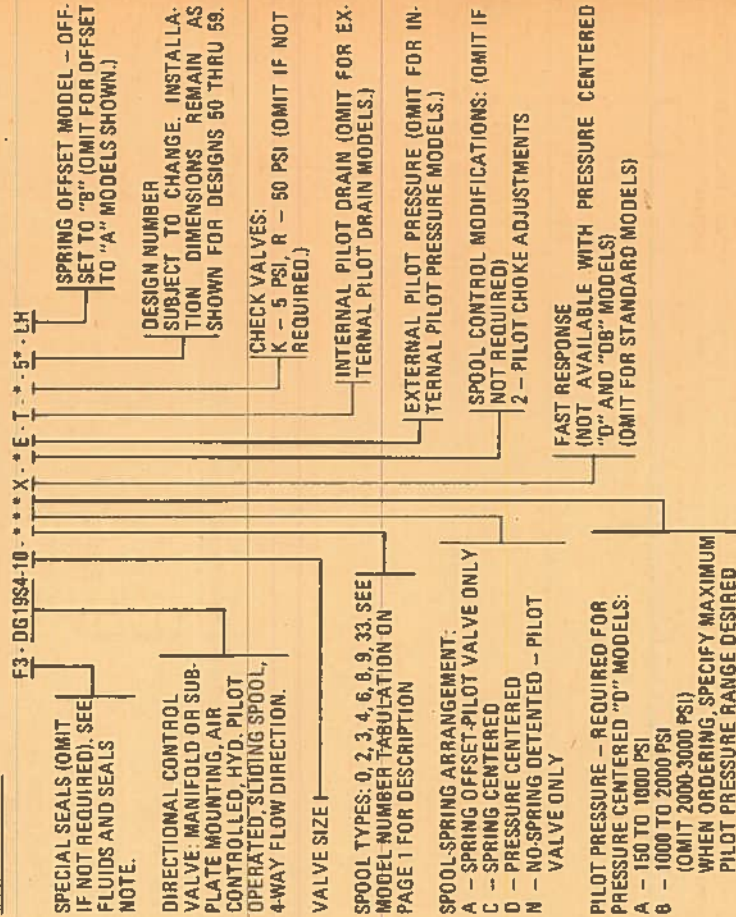
FLUIDS AND SEALS: THE USE OF SYNTHETIC, FIRE-RESISTANT FLUIDS REQUIRES A VALVE WITH SPECIAL SEALS. ADD PREFIX "F3" TO MODEL NUMBER WHEN PHOSPHATE ESTERS OR ITS BLENDS ARE TO BE USED. WATER BASE FLUIDS AND PETROLEUM OIL MAY BE USED WITH STANDARD SEALS. REFER TO DATA SHEET 1-286-S (SECTION L) FOR HYDRAULIC FLUID AND TEMPERATURE RECOMMENDATIONS.

SUBPLATES AND BOLT KITS  
VALVES, SUBPLATES AND MOUNTING BOLTS MUST BE ORDERED SEPARATELY.

EXAMPLE: ONE (1) DG19S4-102C-5" VALVE  
ONE (1) DGSM-10-11 SUBPLATE  
ONE (1) BKDG10-636 BOLT KIT

MAXIMUM RECOMMENDED MOUNTING BOLT TORQUE: ..... 210 FT-LBS.  
WHEN SUBPLATE IS NOT USED, A MACHINED PAD (AS INDICATED BY SUBPLATE SHADED AREA) MUST BE PROVIDED FOR MOUNTING; PAD MUST BE FLAT WITHIN .0005 INCH AND SMOOTH WITHIN 63 MICROINCH. MOUNTING BOLTS, WHEN PROVIDED BY CUSTOMER, SHOULD BE SAE GRADE 7, OR BETTER.

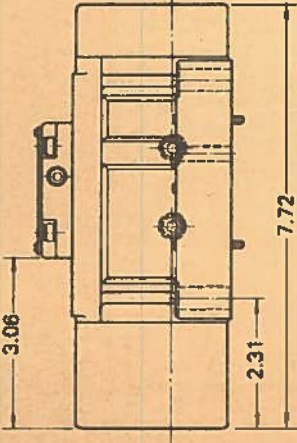
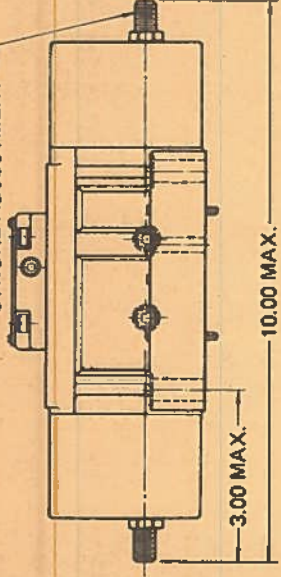



#### MODEL CODE









SPRING OFFSET TYPE DG3S4-04*A*4*			STROKE ADJUSTMENTS DG3S4-04***.1-4*	
				
WEIGHT LBS. (APPROX.) - 11-3/4			WEIGHT LBS. (APPROX.) - 13-1/4	
MODEL NUMBER			DIRECTION OF OIL FLOW FOR PILOT CONTROL INDICATED	
NO. SPRING	SPRING CENTERED	SPRING OFFSET	SPPOOL TYPE	
DG3S4-040-40	DG3S4-040C-40	DG3S4-040A-40	OPEN CENTER ALL PORTS	CENTER APPLIES TO: 1. SPRING CENTERED MODELS PILOT PR. OFF 2. ALL OTHER MODELS AT CENTER CROSSOVER
DG3S4-042-40	DG3S4-042C-40	DG3S4-042A-40	CLOSED CENTER ALL PORTS	PR., CYL. A & CYL. B BLOCKED
	DG3S4-043C-40		CLOSED CENTER P & B	PR. & CYL. B BLOCKED CYL. A → TANK
	DG3S4-044C-40		TANDEM-CLOSED CROSSOVER	PR. → TANK CYL. A & CYL. B BLOCKED
DG3S4-046-40	DG3S4-046C-40	DG3S4-046A-40	CLOSED CENTER P ONLY	PR. BLOCKED CYL. A & CYL. B → TANK
	DG3S4-048C-40		TANDEM-OPEN CROSSOVER	PR. → TANK CYL. A & CYL. B BLOCKED
DG3S4-049-40		DG3S4-049A-40	OPEN CENTER PARTIAL ALL PORTS	PR. CYL. A & CYL. B → TANK
	DG3S4-0433C-40		CLOSED CENTER BLEED A & B	PR. BLOCKED CYL. A & CYL. B → TANK
→ FREE FLOW			X → RESTRICTED FLOW	
			STANDARD GRAPHICAL SYMBOLS FOR FLUID POWER DIAGRAMS	
			DG3S4-04*C*4* SPRING CENTERED 	
			ALL SPOOLS - EXCEPT 9	
			DG3S4-04*A*4* NO SPRING 	
			0-2-8-9 SPOOLS	
			DG3S4-04*A*4* SPRING OFFSET 	
			0-2-8-9 SPOOLS	



# DESCRIPTION

THESE NEW CONCEPT VALVES ARE GENERALLY USED TO CONTROL THE DIRECTION OF FLUID FLOW IN A HYDRAULIC CIRCUIT. THIS, IN TURN, WOULD CONTROL THE DIRECTION OF MOVEMENT OF A WORK CYLINDER OR THE ROTATION OF A FLUID MOTOR.

# RATINGS

VALVE TYPE	SPOOL TYPE	PRESSURE (PSI)	RECOMMENDED FLOW CAPACITY (GPM)	MAX. FLOW (GPM) WITHOUT MALFUNCTION
SPRING CENTERED	2, 3, 6, 33	3000	25	60 ★
	0	3000	25	30
	4, 8	3000	12	12
SPRING OFFSET	0, 2	3000	20	20
	6	1000	25	30
	9	3000	25	40 ★★
NO-SPRING	0, 2, 6, 9	3000	12	12 ★★
		3000	25	25 ★★
		3000	25	60 ★

★ AS SYSTEM FLOW INCREASES, THE MINIMUM PILOT PRESSURE REQUIRED INCREASES. THESE SPOOLS WILL OPERATE SATISFACTORILY IN EXCESS OF 60 GPM.

★★ HIGHER FLOWS MAY BE OBTAINED IF THE RETURN SPRING IS PILOT ASSISTED.

# SYSTEM PRESSURE

MAX. TANK LINE PRESSURE..... 3000 PSI

# PILOT PRESSURE

MAXIMUM PILOT PRESSURE..... 3000 PSI  
ALL SPOOLS AT ZERO FLOW REQUIRE 75 PSI. AT MAXIMUM FLOW WITHOUT MALFUNCTION 80 PSI IS REQUIRED FOR OPEN CENTER SPOOLS (TYPES 0, 4, 8 & 9) AND 125 PSI IS REQUIRED FOR CLOSED CENTER SPOOLS (2, 3, 6 & 33).

FILTRATION RECOMMENDED..... (10 MICRON NOMINAL) 35 MICRON ABSOLUTE

# PRESSURE DROP CHART

SPOOL TYPE	FLOW PATH					
	P TO A	B TO T	P TO B	A TO T	CENTERED P TO T	
0	25	40	25	25	40	
2	35	45	35	35		
3	35	45	35	25	75	
4	70	85	70	85		
6	35	40	35	25	60	
8	35	60	35	50		
9	25	40	25	25		
33	35	45	35	35		

1. FIGURES IN THE PRESSURE DROP CHART GIVE APPROXIMATE PRESSURE DROPS (ΔP) WHEN PASSING 25 GPM FLOW (Q) OF 100 SSU FLUID(S) HAVING .865 SPECIFIC GRAVITY.

2. FOR ANY OTHER FLOW RATE (Q<sub>1</sub>), THE PRESSURE DROP (ΔP<sub>1</sub>) WILL BE APPROXIMATELY:

$$\Delta P_1 = \Delta P(Q_1/Q)^2$$

3. FOR ANY OTHER VISCOSITY(S), THE PRESSURE DROP (ΔP) WILL CHANGE AS FOLLOWS:

OTHER VISCOSITY(S)	75	150	200	250	300	350	400
% OF ΔP (APPROX.)	93	111	119	126	132	137	141

4. FOR ANY OTHER SPECIFIC GRAVITY (G<sub>1</sub>), THE PRESSURE DROP (ΔP<sub>1</sub>) WILL BE APPROXIMATELY:

$$\Delta P_1 = \Delta P(G_1/G)$$

◆ SPECIFIC GRAVITY OF FLUID MAY BE OBTAINED FROM ITS PRODUCER. THE VALUE IS HIGHER FOR FIRE-RESISTANT FLUIDS THAN FOR OIL.

SHIFTING ACTION: SPRING CENTERED AND SPRING OFFSET MODELS MUST HAVE PILOT PRESSURE APPLIED CONTINUOUSLY. NO-SPRING MODELS MAY HAVE PILOT PRESSURE APPLIED MOMENTARILY, BUT CONTINUOUS PRESSURIZATION IS RECOMMENDED (SHOCK, VIBRATION, UNUSUAL PRESSURE TRANSIENTS AND THE SPOOL AXIS NOT BEING HORIZONTAL MAY CAUSE SPOOL REVERSAL.) SPRING CENTERED MODELS RETURN VALVE SPOOL TO CENTER POSITION WHEN BOTH PILOT PORTS ARE DEPRESSURIZED. SPRING OFFSET MODELS RETURN THE SPOOL TO OFFSET POSITION BY SPRING FORCE WHEN PILOT PORT IS DEPRESSURIZED. WHEN NO-SPRING MODELS ARE DEPRESSURIZED, THE SPOOL REMAINS IN THE LAST POSITION ATTAINED, HOWEVER, SHOCK, VIBRATION, UNUSUAL PRESSURE TRANSIENTS AND THE SPOOL NOT BEING HORIZONTAL MAY CAUSE VALVE REVERSAL.

NOTE: WHEN USED AS OTHER THAN A NORMAL 4-WAY VALVE, CONSULT YOUR SPERRY VICKERS REPRESENTATIVE.

NOTE: NO-SPRING MODELS MUST BE INSTALLED WITH LONGITUDINAL AXIS HORIZONTAL FOR GOOD MACHINE RELIABILITY. MOUNTING POSITION OF SPRING CENTERED AND SPRING OFFSET MODELS IS UNRESTRICTED.

# DRAIN LINE

SURGES OF OIL IN A COMMON PILOT VALVE DRAIN LINE, SERVING THESE PILOT OPERATED 4-WAY VALVES AND OTHER VALVES, CAN BE OF SUFFICIENT MAGNITUDE TO CAUSE INADVERTENT SHIFTING OF THESE VALVES. THIS IS PARTICULARLY CRITICAL IN THE NO-SPRING TYPE VALVES. SEPARATE PILOT VALVE DRAIN LINES OR A VENTED DRAIN MANIFOLD WITH A CONTINUOUS DOWNWARD PATH TO TANK IS NECESSARY. (THIS ALSO APPLIES TO CONNECTION "X" ON SPRING OFFSET VALVES, IF "X" IS PIPED AS A DRAIN.)

# INSTALLATION

FLUIDS AND SEALS: THE USE OF SYNTHETIC FIRE-RESISTANT FLUIDS REQUIRES A VALVE WITH SPECIAL SEALS. ADD PREFIX "F3" TO MODEL NUMBER WHEN PHOSPHATE ESTERS OR ITS BLENDS ARE TO BE USED. WATER GLYCOL, WATER-IN-OIL EMULSIONS AND PETROLEUM OIL MAY BE USED WITH STANDARD SEALS. REFER TO DATA SHEET I-286-S (SECTION L) FOR FLUID AND TEMPERATURE RECOMMENDATIONS.

# INTEGRAL CHECK VALVES (IN PRESSURE PORT)

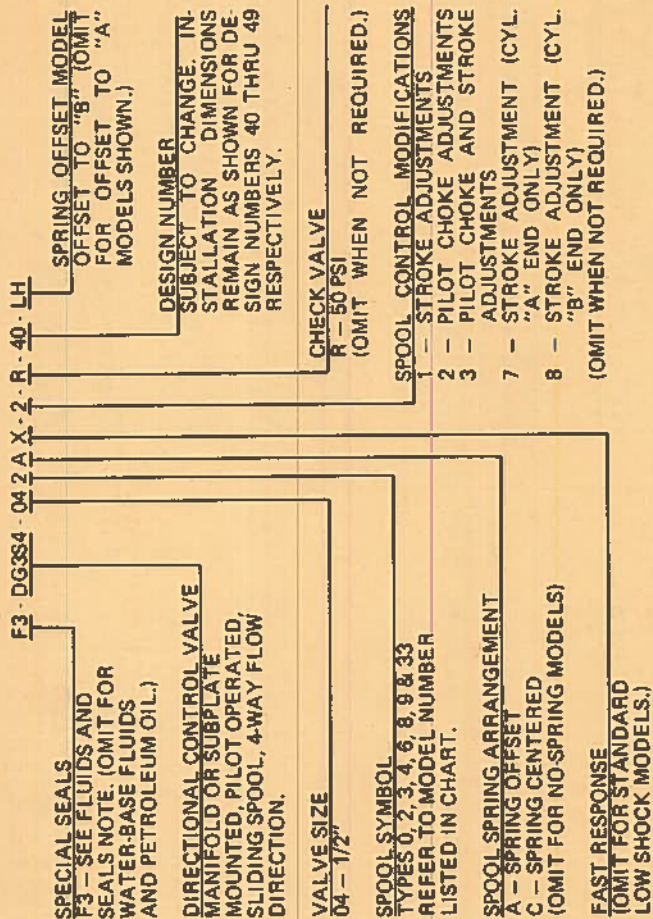
TO MAINTAIN PILOT PRESSURE, A 50 PSI CRACKING PRESSURE CHECK VALVE IS AVAILABLE. SEE MODEL CODE EXPLANATION FOR ORDERING INSTRUCTIONS.

FAST RESPONSE: USE OF THIS OPTION DECREASES SHIFT TIME APPROXIMATELY 60%. HOWEVER, SYSTEM SHOCK GENERATION IS CORRESPONDINGLY INCREASED.

NOTE: THE FAST RESPONSE OPTION IS NOT RECOMMENDED FOR PILOT PRESSURES EXCEEDING 2000 PSI.



MODEL CODE

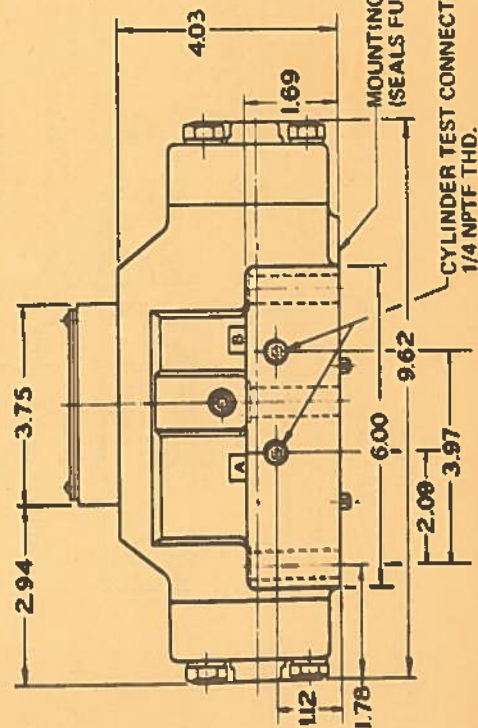
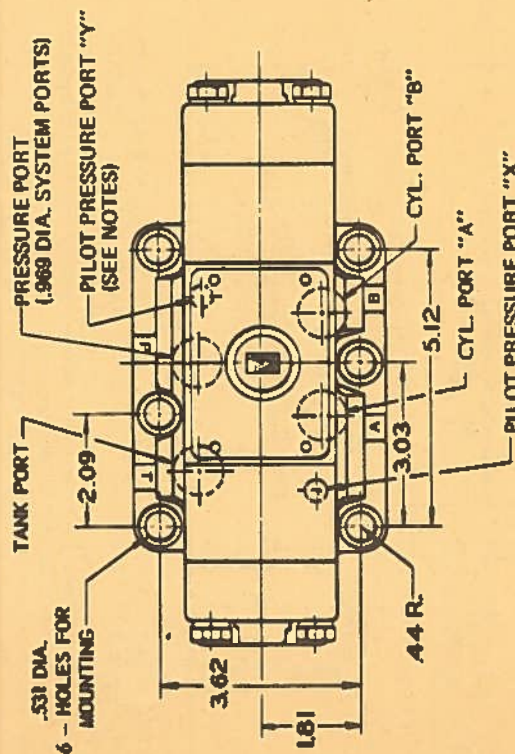




**SPERRY-VICKERS**  
T.M.  
**TROY, MICHIGAN 48064**

**SPERRY VALVES<sup>TM</sup> PILOT OPERATED FOUR-WAY DIRECTIONAL VALVES**

**MANIFOLD OR SUBPLATE MOUNTING  
MODEL SERIES DG3S4-06".51**



**NO-SPRING AND SPRING  
CENTERED TYPES  
WEIGHT LBS. (APPROX.) 27**

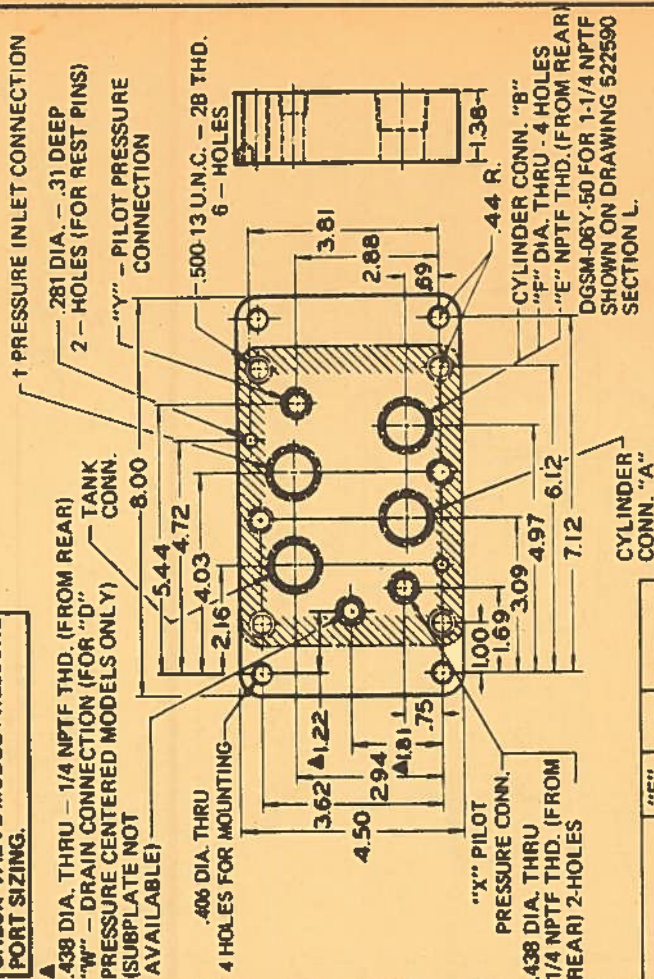
2 - REST PIN  
(SEE SUBPLATE FOR LOCATION) -

REvised 12-1-78

516800A

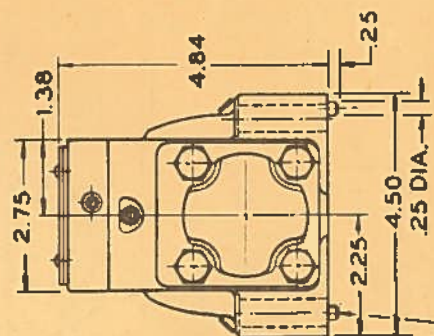
## MOUNTING SUBPLATES

↑SEE NOTE PAGE 3 ON INTEGRAL CHECK VALVE MODEL PRESSURE PORT SIZING.



SUBPLATE MODEL NO.'S.	"E" NPTF THD.	"F" DIA.	WEIGHT (APPROX.)
DGSM-06-50	3/4	.906	11 LBS.
DGSM-06X-50	1"	.969	

PIPE THREADED, SIDE CONNECTION  
SUBPLATES ALSO AVAILABLE WITH  
3/4" AND 1" NPTF THREADS.  
SUBPLATES DGSM-06-50 AND DGSM-  
06X-50 HAVE NO "W" DRAIN CONN.





# PILOT OPERATED PRESSURE CENTERED MODELS



DRAIN "W" (SEE NOTES)

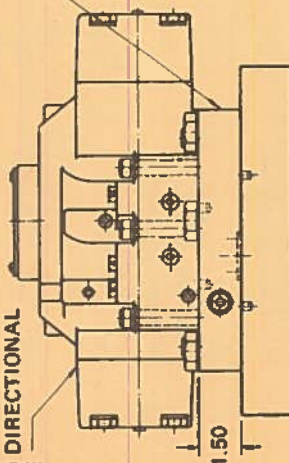
PRESSURE CENTERED TYPE MODELS ARE ALSO AVAILABLE WITH PILOT CHOKE ADJUSTMENTS.

WEIGHT (APPROX.) 61 LBS.

## MOUNTING ADAPTER PLATES (TO REPLACE 1-1/4 DG VALVE)

DGAM-06-50 OR DGAM-06-D-50 ADAPTER PLATE REST PINS "O" RING SEALS AND PLATE MOUNTING SCREWS ARE SUPPLIED WITH THESE ADAPTER PLATES.

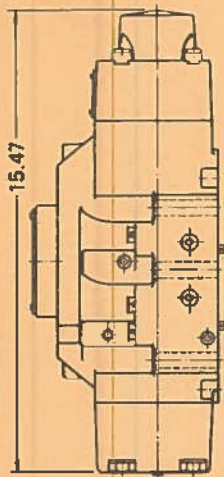
H06 SERIES (DG3) DIRECTIONAL CONTROL VALVE



SUBPLATE FOR 100 SERIES (DG3) VALVE OR EQUIVALENT MACHINED MOUNTING PAD.

# SPRING OFFSET MODELS

**CAUTION**  
HIGH ASSEMBLED  
SPRING LOAD  
SEE VICKERS SERVICE LITERATURE L-3463-S  
FOR DISASSEMBLY INSTRUCTIONS



SPRING OFFSET MODEL HAS INTERNAL SPRING WHICH RETURNS SPOOL WHEN PILOT CONNECTION "X" IS OPEN TO TANK. PILOT CONNECTION "Y" BECOMES A DRAIN CONNECTION. (SEE DRAIN NOTE.)

WEIGHT (APPROX.) 54 LBS.

## MODELS WITH PILOT CHOKE ADJUSTMENTS

PILOT CHOKE ADJUSTMENTS  
(ADJUSTING SCREW .3125-24  
UNF THD. USE 5/32 HEX. KEY)



PILOT CHOKE ADJUSTED BY BACKING OFF LOCKNUTS AND TURNING ADJUSTING SCREWS OUT TO SLOW DOWN RATE OF SPOOL TRAVEL AND IN TO INCREASE THIS RATE.

PILOT OIL FOR MODELS WITH THIS FEATURE SHOULD BE TAKEN FROM A SOURCE HAVING CONSTANT PRESSURE.

WEIGHT (APPROX.) 54 LBS.

## MODEL CODE

SPECIAL SEALS (OMIT IF NOT REQUIRED).  
SEE FLUIDS AND SEALS NOTE.

DIRECTIONAL CONTROL VALVE: MANIFOLD OR SUBPLATE MOUNTED, PILOT OPERATED, SLIDING SPOOL, 4-WAY FLOW DIRECTION

HIGH FLOW 3/4" VALVE SIZE

SPOOL TYPES: 0, 2, 3, 4, 6, 8, 9 & 33. SEE CHART FOR DESCRIPTION.

SPOOL-SPRING ARRANGEMENT:

A - SPRING OFFSET

C - SPRING CENTERED

D - PRESSURE CENTERED

(OMIT FOR NO SPRING MODELS)

F3 - DG3S4 - H06 \* \* X - 2 - \* - 5° - LH

SPRING OFFSET MODEL - OFFSET TO "B". (OMIT FOR OFFSET TO "A" MODELS SHOWN).

DESIGN NUMBER. SUBJECT TO CHANGE. INSTALLATION DIMENSIONS REMAIN AS SHOWN FOR DESIGNS 51 THRU 59.

CHECK VALVES: "K" - 5 PSI. "L" - 35 PSI. "R" - 50 PSI CRACKING PRESSURE (OMIT IF NOT REQUIRED).

PILOT CHOKE ADJUSTMENTS (OMIT IF NOT REQUIRED).

FAST RESPONSE (OMIT FOR STANDARD MODELS).



# SPOOL TYPES AND MODEL COMBINATIONS - PRESSURE DROP DATA

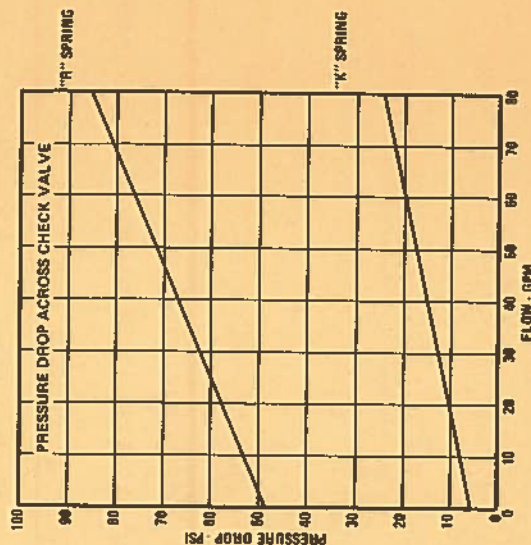
SPOOL TYPE	CENTER POSITION	DESCRIPTION	PRESSURE DROP @ 80 GPM				
			P → A	B → T	P → B	A → T	CENTERED P → T
0		OPEN CENTER - ALL PORTS	30	38	30	45	35
2		CLOSED CENTER - ALL PORTS	28	45	40	37	-
3		CLOSED CENTER - P & B	28	45	40	37	-
4		TANDEM - CLOSED CROSSOVER	35	60	60	37	50
6		CLOSED CENTER - P ONLY	28	38	40	37	-
8		TANDEM - OPEN CROSSOVER	28	40	40	30	50
9		OPEN CENTER PARTIAL - ALL PORTS	34	34	32	40	250
33		CLOSED CENTER - BLEED A & B	28	45	40	37	-

- FIGURES IN PRESSURE DROP CHART GIVE APPROXIMATE PRESSURE DROPS ( $\Delta P$ ) WHEN PASSING 80 GPM FLOW (Q) OF 100 SUS FLUID(S) HAVING .865 SPECIFIC GRAVITY.
- FOR ANY OTHER FLOW RATE ( $Q_1$ ), THE PRESSURE DROP ( $\Delta P_1$ ) WILL BE APPROXIMATELY:  $\Delta P_1 = P (Q_1/Q)^2$ .
- FOR ANY OTHER VISCOSITY (S), THE PRESSURE DROP ( $\Delta P$ ) WILL CHANGE AS FOLLOWS:

OTHER VISCOSITY (S)	75	150	200	250	300	350	400
% OF $\Delta P$ (APPROX.)	93	111	119	126	132	137	141

- FOR ANY OTHER SPECIFIC GRAVITY ( $G_1$ )<sup>●</sup>, THE PRESSURE DROP ( $\Delta P_1$ ) WILL BE APPROXIMATELY:  $\Delta P_1 = \Delta P (G_1/G)$ .

<sup>●</sup>SPECIFIC GRAVITY OF FLUID MAY BE OBTAINED FROM ITS PRODUCER. THE VALUE IS HIGHER FOR FIRE-RESISTANT FLUIDS THAN FOR OIL.



TO DETERMINE CHECK VALVE CRACKING PRESSURE NEEDED TO PROVIDE PILOT PRESSURE CALCULATE TOTAL PRESSURE DROP THRU VALVE AT MINIMUM FLOW. TOTAL PRESSURE DROP IS DETERMINED FROM PRESSURE DROP CHART FOR STANDARD VALVE AND ADDING PRESSURE DROP INDUCED BY CHECK VALVE (SEE GRAPH). TOTAL MUST BE GREATER THAN MINIMUM PSI FOR GOOD MACHINE RELIABILITY. (SEE PILOT PRESSURE AND INTEGRAL CHECK VALVE NOTES.)

## TYPICAL GRAPHICAL VALVE SYMBOLS AND SPOOLS AVAILABLE

DG3S4-H06-C-5*	DG3S4-H06-D-5*	DG3S4-H06-A-5*
SPRING CENTERED	PRESSURE CENTERED	NO-SPRING
ALL SPOOLS	ALL SPOOLS	0-2-6-9 SPOOLS
		SPRING OFFSET
		0-2-6-9 SPOOLS

## DIRECTION OF OIL FLOW FOR SPOOL TYPES AND POSITIONS

SPOOL TYPE	PILOT PR. → "Y" OR SPRING OFFSET	PILOT PR. → "X" TANK
0, 2, 3	PR. → CYL. A	PR. → CYL. B
6, 9, 33	PR. → CYL. B	PR. → CYL. A
4, 8	CYL. A → TANK	CYL. B → TANK

▲ (SEE SHIFTING ACTION NOTE)



# **RATINGS AND SPECIFICATIONS**

MAXIMUM OPERATING PRESSURE (SEE BELOW)..... 3000 PSI  
 MAXIMUM TANK LINE PRESSURE..... 3000 PSI  
 PILOT PRESSURE (MAXIMUM) (SEE FAST RESPONSE NOTE)..... 3000 PSI

## **MINIMUM PILOT PRESSURE PSI**

ALL SPOOLS AT ZERO FLOW REQUIRE 75 PSI.  
 SPRING CENTERED MODELS - AT MAXIMUM FLOW WITHOUT MALFUNCTION 75 PSI IS REQUIRED FOR OPEN CENTERED SPOOLS (TYPES 0, 4 & 8) AND 150 PSI IS REQUIRED FOR CLOSED CENTER SPOOLS (TYPES 2, 3, 6 & 33). TYPE 9 SPOOL REQUIRES 85 PSI.  
 SPRING OFFSET MODELS - AT MAXIMUM FLOW WITHOUT MALFUNCTION 175 PSI IS REQUIRED. (SEE PRESSURE CENTERED OPTION.)

## **FLOW RATINGS**

RECOMMENDED FLOW AT 3000 PSI..... 80 GPM  
 MAXIMUM FLOW AND PRESSURE WITHOUT MALFUNCTION:  
 SPRING CENTERED MODEL WITH TYPE "9" SPOOL..... 100 GPM @ 2000 PSI  
 SPRING OFFSET MODELS (ALL SPOOLS)..... 160 GPM @ 2000 PSI  
 ALL OTHER MODELS..... 160 GPM @ 3000 PSI

NOTE: PRESSURE CENTERED MODELS - AS SYSTEM FLOW INCREASES THE MINIMUM PILOT PRESSURE REQUIRED INCREASES. ALL SPOOLS WILL OPERATE SATISFACTORILY IN EXCESS OF RATED GPM WITH HIGHER PILOT PRESSURES.

**DRAIN LINE**  
 SURGES OF OIL IN A COMMON PILOT VALVE DRAIN LINE, SERVING THESE PILOT OPERATED 4-WAY VALVES AND OTHER VALVES CAN BE OF SUFFICIENT MAGNITUDE TO CAUSE INADVERTENT SHIFTING OF THESE VALVES. THIS IS PARTICULARLY CRITICAL IN THE NO SPRING TYPE VALVES. SEPARATE PILOT VALVE DRAIN LINES OR A VENTED DRAIN MANIFOLD WITH A CONTINUOUS DOWNWARD PATH TO TANK IS NECESSARY. (THIS ALSO APPLIES TO CONNECTION "Y" ON SPRING OFFSET VALVES, IF "Y" IS PIPED AS A DRAIN).

PRESSURE CENTERED "W" DRAIN CONNECTION MUST BE PIPED DIRECTLY TO TANK THRU A SURGE FREE LINE SO THERE WILL BE NO BACK PRESSURE AT THIS DRAIN.

**FILTRATION RECOMMENDED**..... (10 MICRON NOMINAL) 35 MICRON ABSOLUTE MOUNTING

POSITION: NO SPRING MODELS MUST BE INSTALLED WITH THE LONGITUDINAL AXIS HORIZONTAL FOR GOOD MACHINE RELIABILITY. MOUNTING POSITION OF SPRING OFFSET AND SPRING CENTERED AND PRESSURE CENTERED MODELS IS UNRESTRICTED PROVIDED THAT THE PILOT PRESSURE SUPPLY IS MAINTAINED AS REQUIRED.

## **SHIFTING ACTION**

	TO SHIFT P→A OR P→B	TO CENTER
SPRING CENTERED	PILOT PRESSURE HELD ON ONE PILOT PRESSURE PORT, THE OTHER PILOT PRESSURE PORT TO TANK	BOTH PILOT PRESSURE PORTS OPEN TO TANK
SPRING OFFSET		DOES NOT STOP AT CENTER
PRESSURE CENTERED		▲▲BOTH PILOT PRESSURE PORTS CONNECTED TO PRESSURE
NO SPRING	PILOT PRESSURE MAY BE APPLIED MOMENTARILY ▲ TO ONE PILOT PRESSURE PORT THEN DROPPED	DOES NOT STOP AT CENTER

▲ WHEN PILOT PRESSURE IS REMOVED FROM NO SPRING MODELS, THE SPOOL WILL REMAIN IN THE LAST POSITION ATTAINED, PROVIDED THERE IS NO SHOCK, VIBRATION, UNUSUAL PRESSURE TRANSIENTS AND THE SPOOL AXIS IS HORIZONTAL.

▲▲ CENTERING SPRINGS ARE USED, IN ADDITION TO PILOT PRESSURE, TO ENSURE CENTERING (FLOW MUST BE WITHIN THE SPRING CENTERED RATINGS) SHOULD PILOT PRESSURE FAIL. SPRINGS CAN BE REMOVED BY USER, IF NOT WANTED.

# **SUBPLATES AND BOLT KITS**

VALVES, SUBPLATES AND MOUNTING BOLTS MUST BE ORDERED SEPARATELY. EXAMPLE:  
 ONE (1) DG354-H062C-5\* VALVE  
 ONE (1) DGSM-06Y-5\* SUBPLATE  
 ONE (1) BKDG06-618 BOLT KIT

MAXIMUM RECOMMENDED MOUNTING BOLT TORQUE..... 700 IN. LBS.

NOTE: CENTER MOUNTING BOLTS (2) ARE OPTIONAL. ALL SIX BOLTS ARE RECOMMENDED FOR PRESSURE RANGE OF 2000 TO 3000 PSI FOR MAXIMUM SEAL LIFE.

WHEN SUBPLATE IS NOT USED, A MACHINED PAD (AS INDICATED BY SUBPLATE SHADED AREA) MUST BE PROVIDED FOR MOUNTING; PAD MUST BE FLAT WITHIN .0005 INCH AND SMOOTH WITHIN 63 MICROINCH. MOUNTING BOLTS, WHEN PROVIDED BY CUSTOMER, SHOULD BE SAE GRADE 7, OR BETTER.

ADAPTER PLATES DGAM-06-5\* AND FOR PRESSURE CENTERED MODELS DGAM-06-D-5\* WITH "W" DRAIN ARE AVAILABLE TO ADAPT THE DG54-H06\*-5\* SERIES TO PRESENT DG54-10\*-5\* SERIES INSTALLATIONS. (SEE GRAPHIC3).

SIDE CONNECTION SUBPLATES ALSO AVAILABLE WITH 3/4 AND 1" NPTF THD'S.

## **OPTIONAL FEATURES**

**PRESSURE CENTERED VALVES:** THIS OPTION PROVIDES MORE POSITIVE CENTERING THROUGH GREATER FORCE. PRESSURE CENTERED MODELS REQUIRE A HIGHER MINIMUM PILOT PRESSURE. (SEE CHART) THIS PRESSURE IS NOT AVAILABLE THROUGH USE OF AN INTEGRAL CHECK-VALVE. (SEE DRAIN NOTE-AND SHIFTING ACTION NOTE).

**MINIMUM PILOT PRESSURE WHEN SHIFTING P→A AND P→B.**

SPOOL TYPE	FLOW (GPM)	MINIMUM PILOT PRESSURE (PSI)	
		P→A	P→B
ALL SPOOLS	0	75	200
0, 4 AND 8	160	75	200
9	100	85	210
2, 3, 6 AND 33	160	150	400

NOTE: ON PRESSURE CENTERED MODELS END COVERS CANNOT BE INTERCHANGED. PILOT PRESSURE IS NOT AVAILABLE THROUGH USE OF AN INTEGRAL CHECK VALVE. THE CENTERING TIME DEPENDS ON THE RATE AT WHICH THE PILOT OIL REACHES THE PILOT CHAMBERS.

FAST RESPONSE: USE OF THIS OPTION DECREASES THE SHIFT TIME AND INCREASES THE SYSTEM SHOCK GENERATION. AVAILABLE BY ADDING SYMBOL "X" TO MODEL NUMBER. EXAMPLE: DG354-H062CX-5\*

BECAUSE OF THE HIGH DRAIN LINE PRESSURE TRANSIENTS GENERATED DURING SHIFTING, USE OF THE FAST RESPONSE OPTION IS NOT RECOMMENDED FOR PILOT PRESSURES EXCEEDING 2000 PSI.

ALL SPRING CENTERED MODELS REQUIRE APPROXIMATELY 0.110 OF A SECOND TO CENTER FROM EITHER SIDE.

ALL SPRING OFFSET MODELS REQUIRE APPROXIMATELY 0.180 OF A SECOND TO SPRING RETURN.

INTEGRAL CHECK VALVES (IN PRESSURE PORT): FOR PILOT PRESSURE 50 PSI IN CRACKING PRESSURE. FOR PREVENTING REVERSE FLOW, OTHER THAN LEAKAGE, IN CLAMP CIRCUITS - 5 PSI CRACKING PRESSURE. SEE PILOT PRESSURE AND CHECK VALVE NOTES.

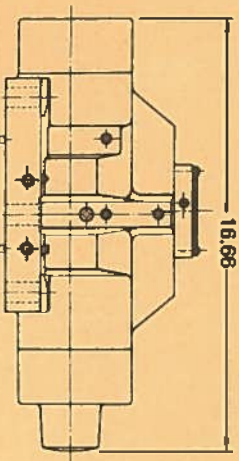
FLUIDS AND SEALS: THE USE OF SYNTHETIC, FIRE-RESISTANT FLUIDS REQUIRES A VALVE WITH SPECIAL SEALS. ADD PREFIX "F3" TO MODEL NUMBER WHEN PHOSPHATE ESTERS TYPE FLUIDS OR ITS BLENDS ARE TO BE USED. WATER GLYCOL, WATER-IN-OIL EMULSION FLUIDS AND PETROLEUM OIL MAY BE USED WITH STANDARD SEALS. (SEE FLUID AND TEMPERATURE RECOMMENDATIONS DATA SHEET 1-286-S SECTION L.)

WHEN USED AS OTHER THAN A NORMAL 4-WAY VALVE, CONSULT YOUR SPERRY VICKERS REPRESENTATIVE.



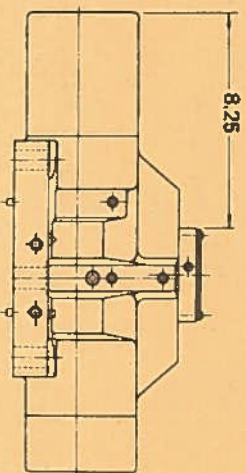
# **SPRING OFFSET MODELS** WEIGHT (APPROX.) 95 LBS.

**CAUTION**  
HIGH ASSEMBLED  
SPRING LOAD  
CALL: SPERRY VICKERS SERVICE DEPARTMENT  
FOR DISASSEMBLY INSTRUCTIONS



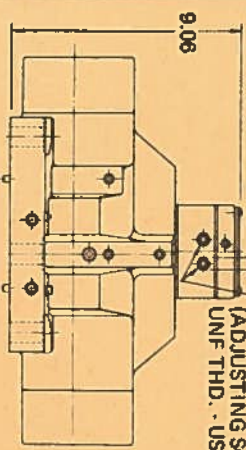
SPRING OFFSET MODEL HAS INTERNAL SPRING WHICH OFFSETS SPOOL WHEN PILOT CONNECTION "X" IS OPEN TO TANK. PILOT CONNECTION "Y" BECOMES A DRAIN CONNECTION WHICH MUST BE CONNECTED DIRECTLY AND INDEPENDENTLY TO TANK AT ATMOSPHERIC PRESSURE THROUGH SURGE FREE LINE. BACK PRESSURE AT THIS CONNECTION WOULD CAUSE VALVE MALFUNCTION.

# **PRESSURE CENTERED MODELS** WEIGHT (APPROX.) 97 LBS.



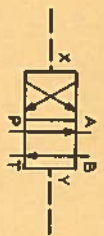
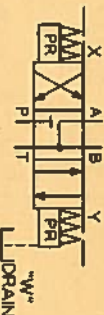
PRESSURE CENTERED MODELS REQUIRE A MINIMUM OF 150 PSI FOR PILOT PRESSURE. SPRINGS ARE PROVIDED TO ASSURE CENTERING IN CASE OF PILOT PRESSURE FAILURE. (SEE NOTES ON OPTIONAL FEATURES PAGE 517000-2.)

# **MODELS WITH PILOT CHOKE ADJUSTMENTS** WEIGHT (APPROX.) 92 LBS.



PILOT CHOKE IS ADJUSTED BY BACKING OFF LOCKNUTS AND TURNING ADJUSTING SCREWS OUT TO SLOW DOWN RATE OF SPOOL TRAVEL AND IN TO INCREASE THIS RATE. PILOT OIL FOR MODELS WITH THIS FEATURE SHOULD BE TAKEN FROM A SOURCE HAVING CONSTANT PRESSURE.

## **TYPICAL GRAPHICAL SLIDING SPOOL SYMBOLS**



SPRING CENTERED

PRESSURE CENTERED

NO SPRING

SPRING OFFSET

MODEL NUMBER				SPOOL TYPE	DIRECTION OF OIL FLOW FOR VALVE SPOOL POSITIONS		
NO SPRING	SPRING CENTERED	PRESSURE CENTERED	SPRING OFFSET		CENTER - APPLIES TO: 1. SPRING OR PRESSURE CENTERED MODELS AT CENTER 2. NO SPRING OR SPRING OFFSET MODELS AT CROSS OVER	PILOT PR. → "Y" CONN. "X" → TANK OR SPRING OFFSET	PILOT PR. → "X" CONN. "Y" → TANK
DG3S4-100-5*	DG3S4-100C-5*	DG3S4-100D-5*	DG3S4-100A-5*	OPEN CENTER ALL PORTS	PR. CYL. A & CYL. B → TANK	PR. → CYL. A CYL. B → TANK	PR. → CYL. B CYL. A → TANK
DG3S4-102-5*	DG3S4-102C-5*	DG3S4-102D-5*	DG3S4-102A-5*	CLOSED CENTER ALL PORTS	PR. CYL. A & CYL. B BLOCKED	PR. → CYL. A CYL. B → TANK	PR. → CYL. B CYL. A → TANK
	DG3S4-103C-5*	DG3S4-103D-5*		CLOSED CENTER P & B	PR. & CYL. B BLOCKED CYL. A → TANK		
	DG3S4-104C-5*	DG3S4-104D-5*		TANDEM CLOSED CROSSOVER	PR. → TANK CYL. A & CYL. B BLOCKED	PR. → CYL. B CYL. A → TANK	PR. → CYL. A CYL. B → TANK
DG3S4-106-5*	DG3S4-106C-5*	DG3S4-106D-5*	DG3S4-106A-5*	CLOSED CENTER P ONLY	PR. BLOCKED CYL. A & CYL. B → TANK	PR. → CYL. A CYL. B → TANK	PR. → CYL. B CYL. A → TANK
	DG3S4-108C-5*	DG3S4-108D-5*		TANDEM OPEN CROSSOVER	PR. → TANK CYL. A & CYL. B BLOCKED	PR. → CYL. B CYL. A → TANK	PR. → CYL. A CYL. B → TANK
DG3S4-109-5*	DG3S4-109C-5*	DG3S4-109D-5*	DG3S4-109A-5*	OPEN CENTER PARTIAL-ALL PORTS	PR. CYL. A & CYL. B → TANK	PR. → CYL. A CYL. B → TANK	PR. → CYL. B CYL. A → TANK
	DG3S4-1033C-5*	DG3S4-1033D-5*		CLOSED CENTER BLEED A & B	PR. BLOCKED CYL. A & CYL. B → TANK		PR. → CYL. B CYL. A → TANK
FULL FLOW → RESTRICTED FLOW ↘							

517000-1

FULL FLOW -> RESTRICTED FLOW ->



**SPERRY VICKERS**  
T.M.

# **PILOT OPERATED FOUR-WAY DIRECTIONAL VALVES**

MANIFOLD OR SUBPLATE MOUNTING  
MODEL SERIES DG3S4-10

SPERRY VICKERS  
TROY, MICHIGAN 48064

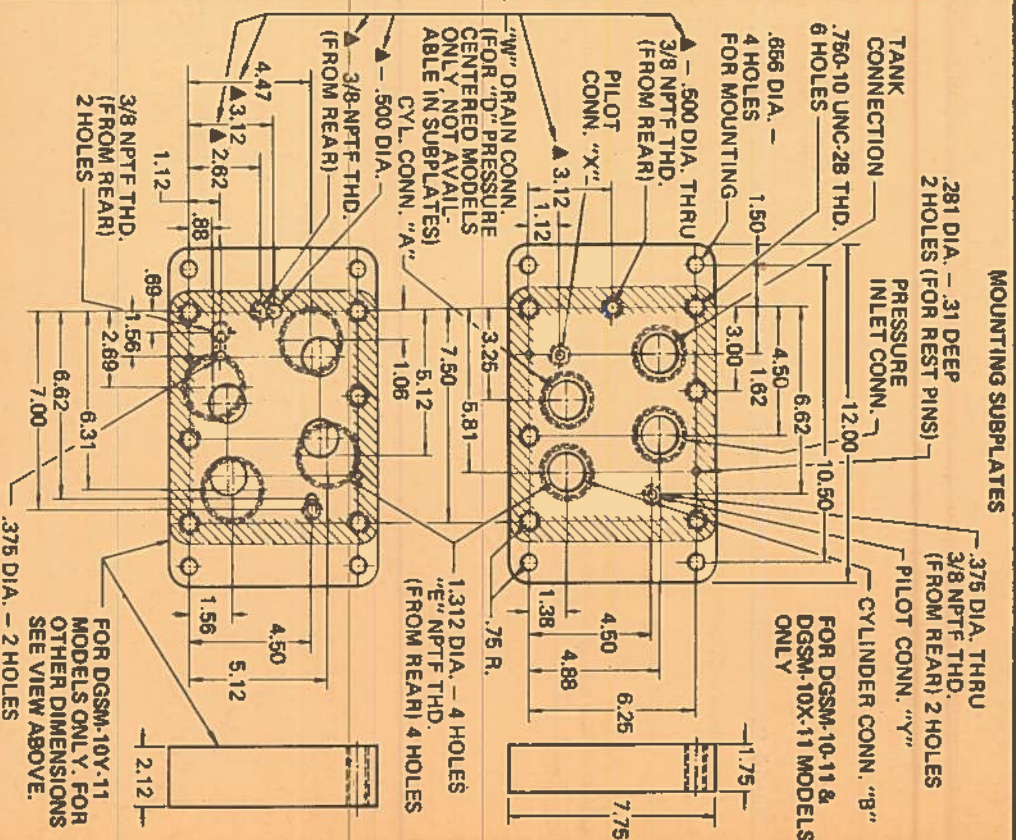
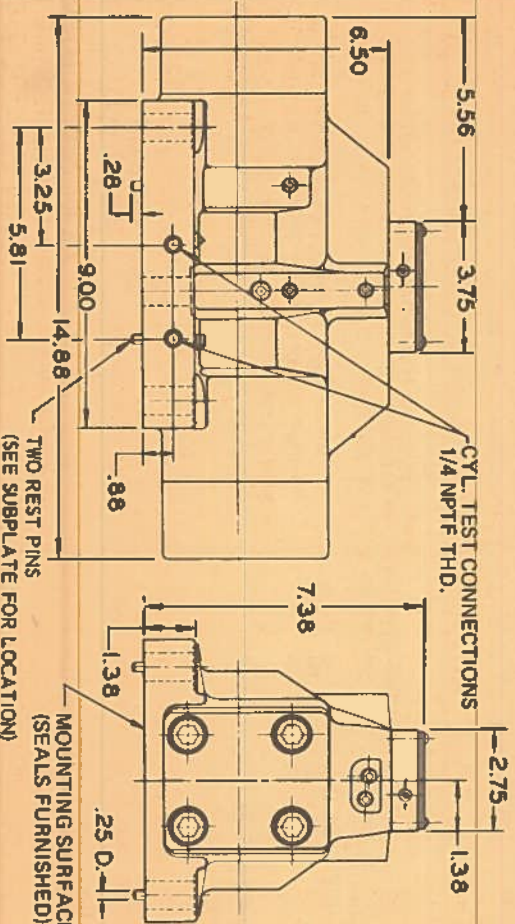
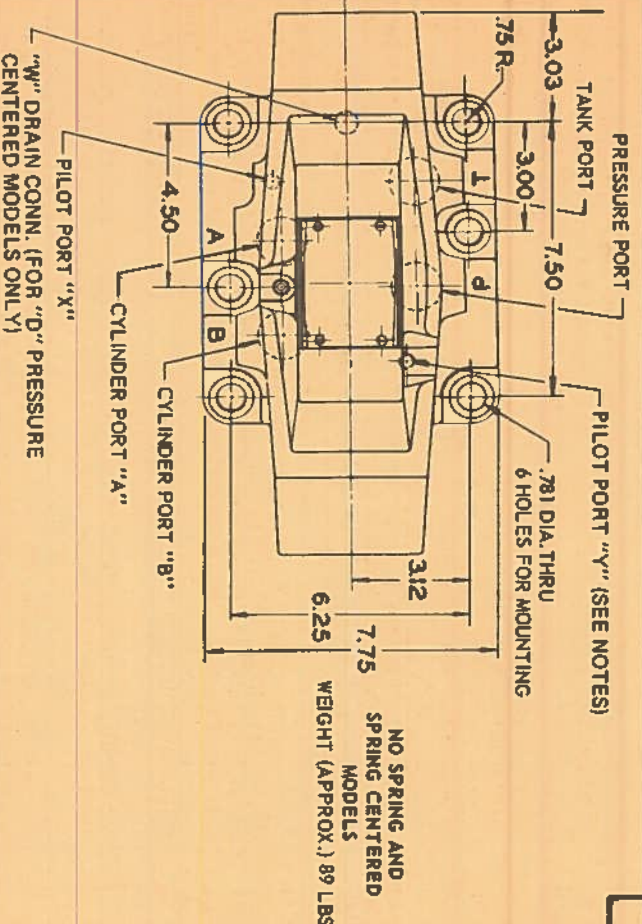
SPRING CENTERED, PRESSURE  
CENTERED, SPRING OFFSET  
AND NO SPRING MODELS

TO 250 GPM  
AND 3000 PSI

FOR 1-1/4"  
1-1/2" & 2"  
PIPING

MANIFOLD OR  
SUBPLATE  
MOUNTING

DWG. NO.  
517000



SUBPLATE MODEL NO.	"E" NPTF THD.	WEIGHT (APPROX.)
DGSM-10-11	1-1/4	38
DGSM-10X-11	1-1/2	46
DGSM-10Y-11	2"	46

▲ SUBPLATES DGSM-10-11, DGSM-10X-11 AND DGSM-10Y-11 HAVE NO "W" DRAIN CONNECTION.

REVISED 2-2-76

517000



# PERFORMANCE CURVES

## INSTALLATION NOTES

ALL CONNECTIONS ARE MADE TO CARD ON THE SIDE OPPOSITE OF THE COMPONENTS.

CONNECTOR SPACING: .156 IN. .15 TERMINAL SUITABLE CONNECTORS ARE:

VIKING	215 VH/ANS	} OR DIMENSIONAL EQUIVALENT (RIGHT ANGLE)
CINCH	251 15, 30, 160	
AMPHENOL	225, 21521, 105	

CONTROL ADJUSTMENTS TO BE MADE WITH .125 IN. SCREWDRIVER, FROM EITHER SIDE OF BOARD.

CABLE SHIELD TO BE GROUNDED AT PINS ONLY.

ANY WIRE RUNS EXCEEDING 15.0 IN. IN LENGTH SHALL BE MADE WITH FOIL SHIELDED CABLE, AWG NO. 20 OR LARGER.

HEAT SINK IS ELECTRICALLY AND THERMALLY "HOT."

FOR ADDITIONAL APPLICATION CIRCUITS SEE DRAWING EMCS 20 DRAWING NO. 521555.

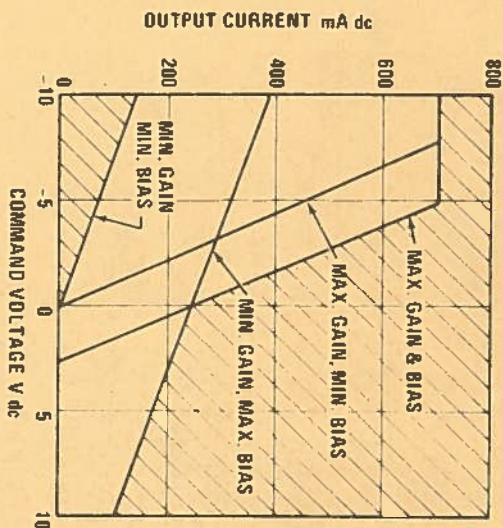
DIMENSION SHOWN PROVIDES ADEQUATE INSTALLATION CLEARANCE.

## POWER SUPPLY DATA

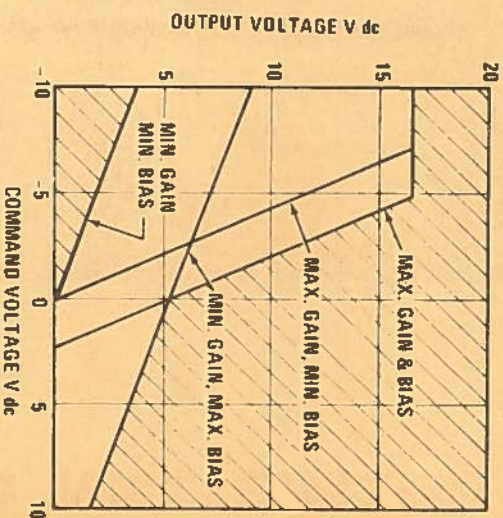
WITH A LOAD OF 600mA, AND A  $\pm 19V$  dc UNREGULATED POWER SOURCE:

+24V OUTPUT (PIN P) -	$\pm 20\%$ , 100mA UNREGULATED.
+12V OUTPUT (PIN J) -	$\pm 5\%$ , 4mA, 1% REGULATION, LINE AND LOAD.
-12V OUTPUT (PIN H) -	$\pm 5\%$ , 13mA, 1% REGULATION, LINE AND LOAD.
-8.2V OUTPUT (PIN E) -	$\pm 5\%$ , 2.2mA, 0.2% REGULATION, LINE AND LOAD.

CURRENT MODE  
OUTPUT CURRENT vs. COMMAND VOLTAGE

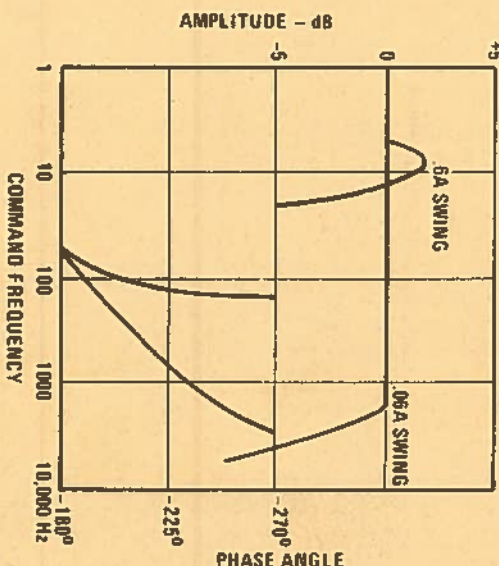


VOLTAGE MODE  
OUTPUT VOLTAGE vs. COMMAND VOLTAGE

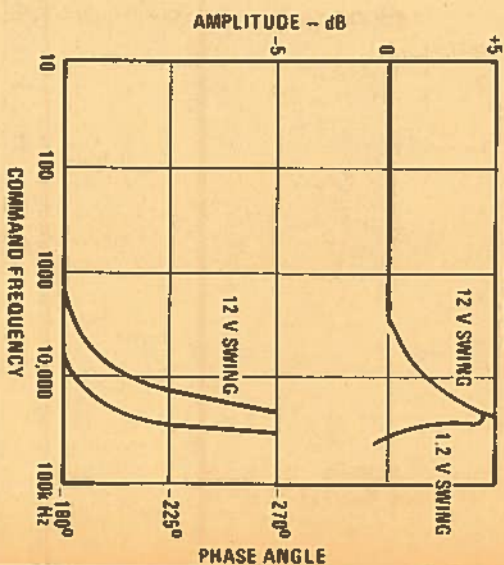


TYPICAL FREQUENCY RESPONSE

CURRENT MODE

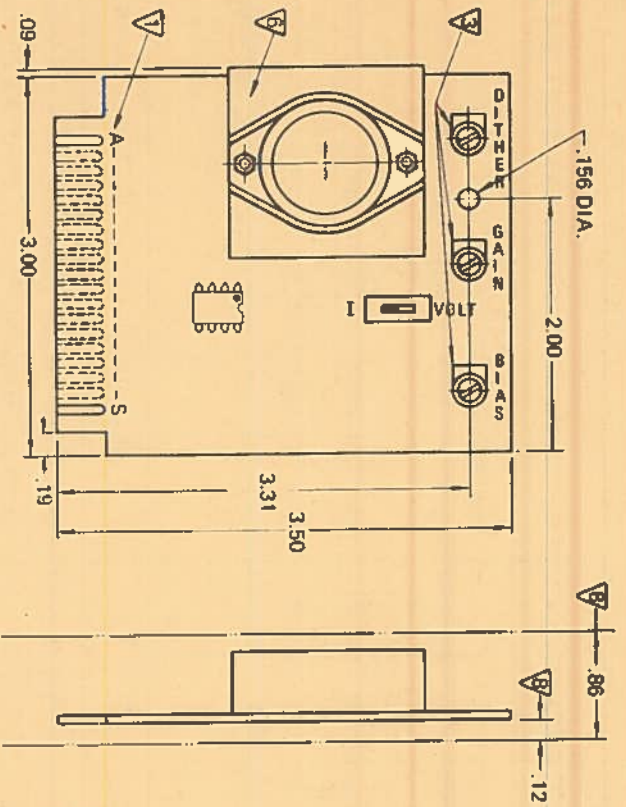


VOLTAGE MODE





# DIMENSIONS IN INCHES



# SPEER-V VICKERS

# CURRENT / VOLTAGE AMPLIFIER

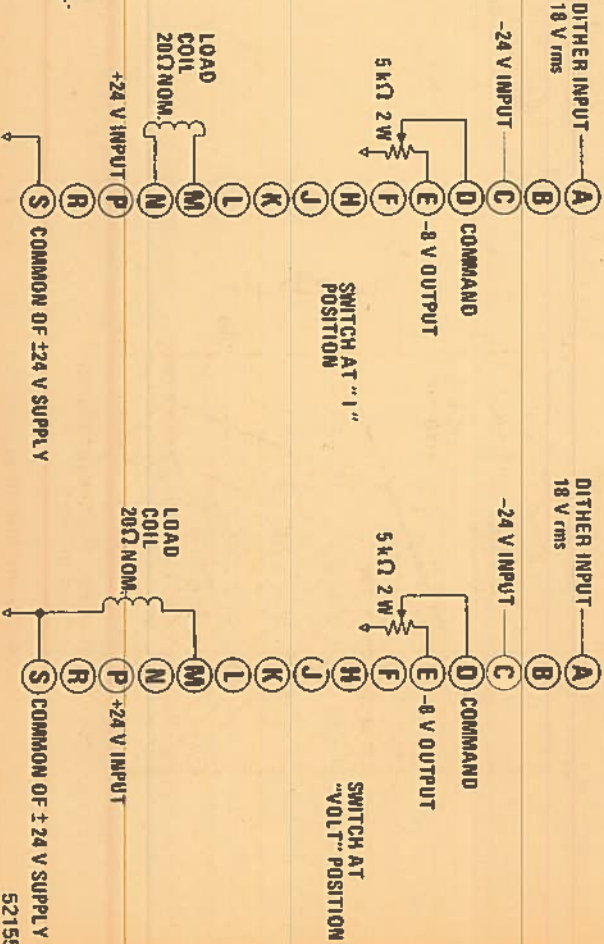
## MODEL EM-H-10

### SPECIFICATIONS

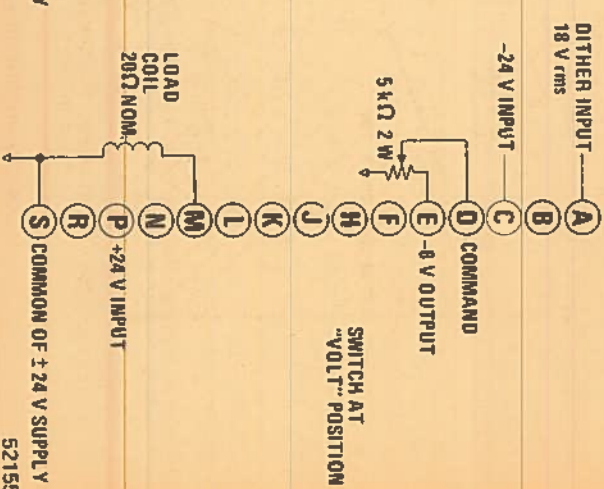
PARAMETER	VOLTAGE MODE	CURRENT MODE
INPUT POWER VOLTAGE	$\pm 24$ V dc $\pm 20\%$	$\pm 24$ V dc $\pm 20\%$
DITHER VOLTAGE	18 V rms	18 V rms
OUTPUT RANGE	0-16 V dc	0-600 mA dc
MAX. GAIN	0-3.2 V dc	0-120 mA dc
MIN. GAIN	0-8.0 V dc	0-250 mA dc
BIAS RANGE	0-100 mA rms	0-100 mA rms
DITHER RANGE	45-2.3 VOLTS/VOLT	16-80 mA/VOLT
GAIN RANGE	$< .08$ V dc DEVIATION	$< 2$ mA DEVIATION
LINEARITY	$< .01$ V dc CHANGE	$< .5$ mA CHANGE
LOAD REGULATION	IN SETTING	IN SETTING
(18-300 $\Omega$ LOAD CHANGE)	$< .05$ V dc CHANGE	$< 4$ mA CHANGE
LINE REGULATION	IN SETTING	IN SETTING
(19-28 V dc INPUT)	.015 mV/°F	.29 mA/°F
TEMP. COEFFICIENT	INTERNAL COMMAND)	INTERNAL COMMAND)
(INTERNAL COMMAND)	500,000 V/s	100 A/s
STEP RATE (MINIMUM)	2 V	80-100 mA
STEP RESPONSE OVERSHOOT		

SEE REVERSE SIDE FOR POWER SUPPLY DATA.

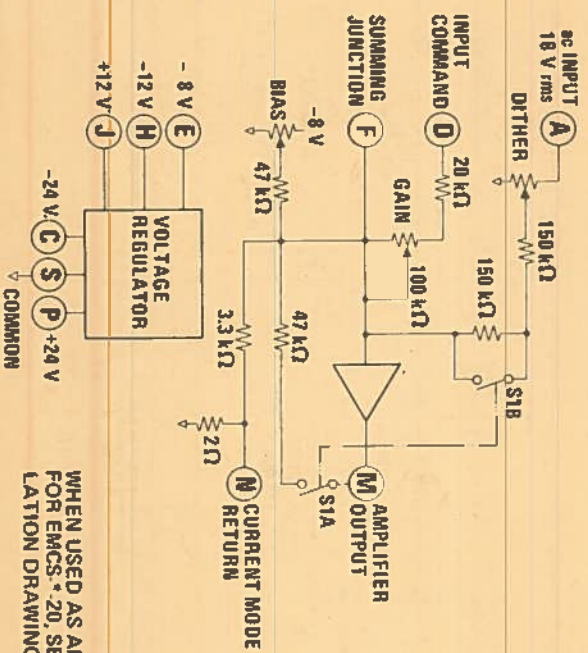
### CONNECTION DIAGRAM FOR VARIABLE CURRENT REGULATING POWER AMPLIFIER



### CONNECTION DIAGRAM FOR VARIABLE VOLTAGE REGULATING POWER AMPLIFIER



### OPERATIONAL SCHEMATIC

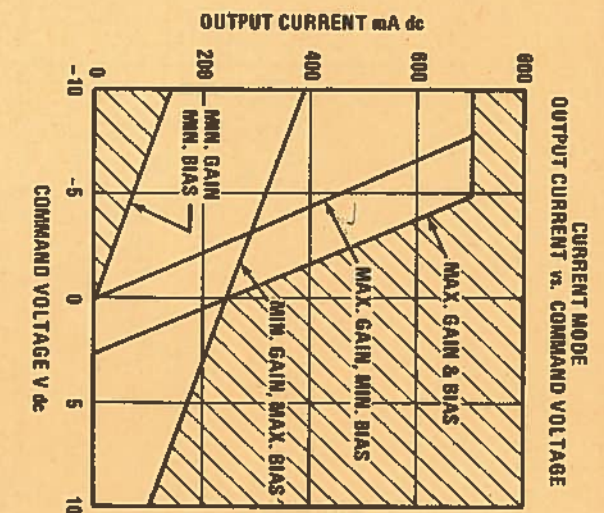


WHEN USED AS AMPLIFIER FOR EMCS-20, SEE INSTALLATION DRAWING 521556.

REVISED 6-1-77

521556

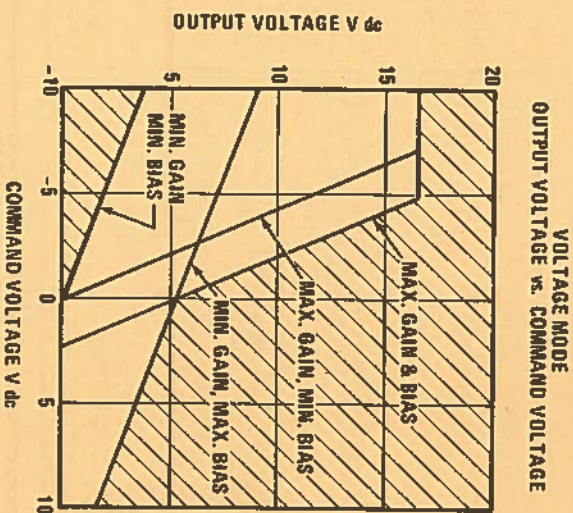




**NOTE**  
CURRENT MODE: SLIDE SWITCH  
IN "I" (LEFT, OPEN) POSITION  
VOLTAGE MODE: SLIDE SWITCH  
IN "V" (RIGHT, CLOSED)  
POSITION SHOWN

ELECTRONIC MODULE CONTROL SUPPLY	DESIGN NUMBER SUBJECT TO CHANGE. INSTALLATION DI- MENSIONS REMAIN AS SHOWN FOR DESIGN NUMBERS 20 THRU 29.
M-POWER SUPPLY & AMPLIFIER	
P-POWER SUPPLY, AMPLIFIER & CONTROL PANEL	

**NOTE:** FOR AMPLIFIER MODULE WITHOUT CONTROL SUPPLY REFER TO EM-H-10 (DRAWING 521556).





**SPEIRY + VICKERS**

**POWER SUPPLY**

MODEL SERIES EMCS-20 DESIGN

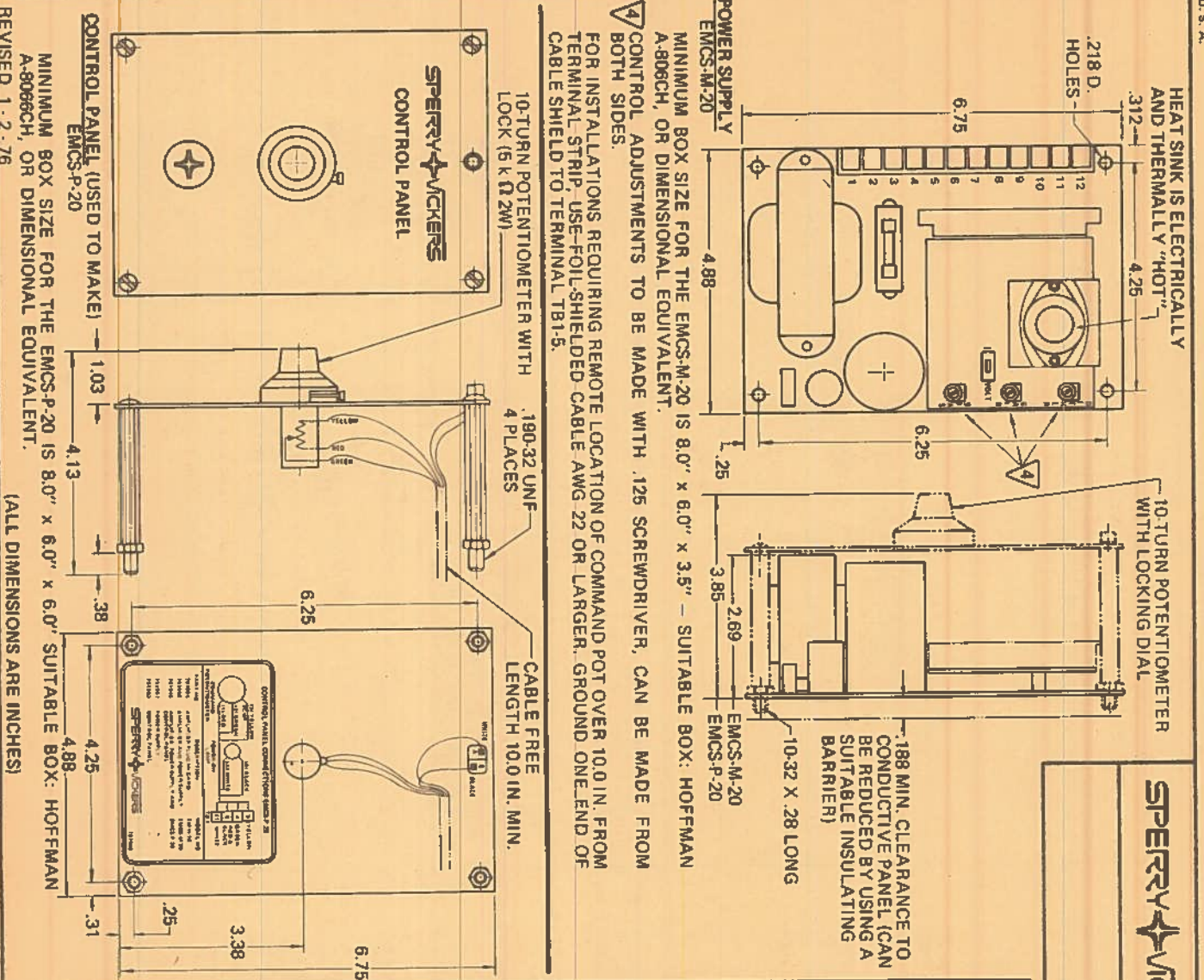
**SPEIRY + VICKERS**  
TROY, MICHIGAN 48064

POWER SUPPLY

FOR ELECTRICALLY-  
MODULATED VALVES.

MODEL SERIES  
EMCS-20

DWG. NO.  
621555



**GENERAL DATA**  
THIS POWER SUPPLY IS DESIGNED TO OPERATE ELECTRICALLY CONTROLLED VALVES BY MAINTAINING A CONSTANT CURRENT OR VOLTAGE UNDER VARYING OPERATING CONDITIONS. (NOMINAL LOAD OF 20  $\Omega$ .)

THE POWER SUPPLY OUTPUT MAY BE CONTROLLED BY THE OPTIONAL CONTROL KNOB IF LOCALLY OPERATED OR BY A REMOTE POTENTIOMETER IF REMOTELY CONNECTED. CLOCKWISE ROTATION INCREASES OUTPUT.

**SPECIFICATIONS**

PARAMETER	VOLTAGE MODE	CURRENT MODE
INPUT POWER	115 V ac $\pm 10\%$	115 Vac $\pm 10\%$
VOLTAGE	50/60 Hz	50/60 Hz
OUTPUT RANGE		
MAX. GAIN	0-16 V dc	0-800 mA dc
MIN. GAIN	0-3.2 V dc	0-120 mA dc
BIAS RANGE	0-8.0 V dc	0-250 mA dc
DITHER RANGE	0-100 mA rms	0-100 mA rms
GAIN RANGE	45-2.3 VOLTS/VOLT	16-80 mA/VOLT
LINEARITY	< .08 V DEVIATION	< 2 mA DEVIATION
LOAD REGULATION (18-30 $\Omega$ LOAD CHANGE)	< .01 V dc CHANGE IN SETTING	< .5 mA CHANGE IN SETTING
LINE REGULATION (104-126 VAC INPUT)	< .05 V dc CHANGE IN SETTING	< 4 mA CHANGE IN SETTING
TEMP. COEFFICIENT (INTERNAL COMMAND)	.015 mV/ $^{\circ}$ F	.29 mA/ $^{\circ}$ F
SLEW RATE (MINIMUM)	500,000 V/SEC	100 A/SEC
STEP RESPONSE	2 V	80-100 mA
OVERSHOOT		

■ MAXIMUM OUTPUT IS 550 mA dc FOR RATED REGULATION AT 30  $\Omega$  LOAD AND 104 V ac INPUT VOLTAGE.

● SHORT CIRCUIT PROTECTION EXISTS ONLY IN CURRENT MODE.

521555







**SPERRY VICKERS**

**AMPLIFIER MODULE**

MODEL EM-D-20

**Application**  
This amplifier is designed to control SA4-03, SA4-06, SC4-03, and SF4 servo valves; servo pumps; CGE-06 and CGE-10 pressure control valves in closed loop pressure control circuits; and FCGT-02 and FGE-06 flow control valves in closed loop flow or speed control circuits. In addition, the voltage amplifier portion of the unit may be used independently for other related control circuit functions.

**General Description**

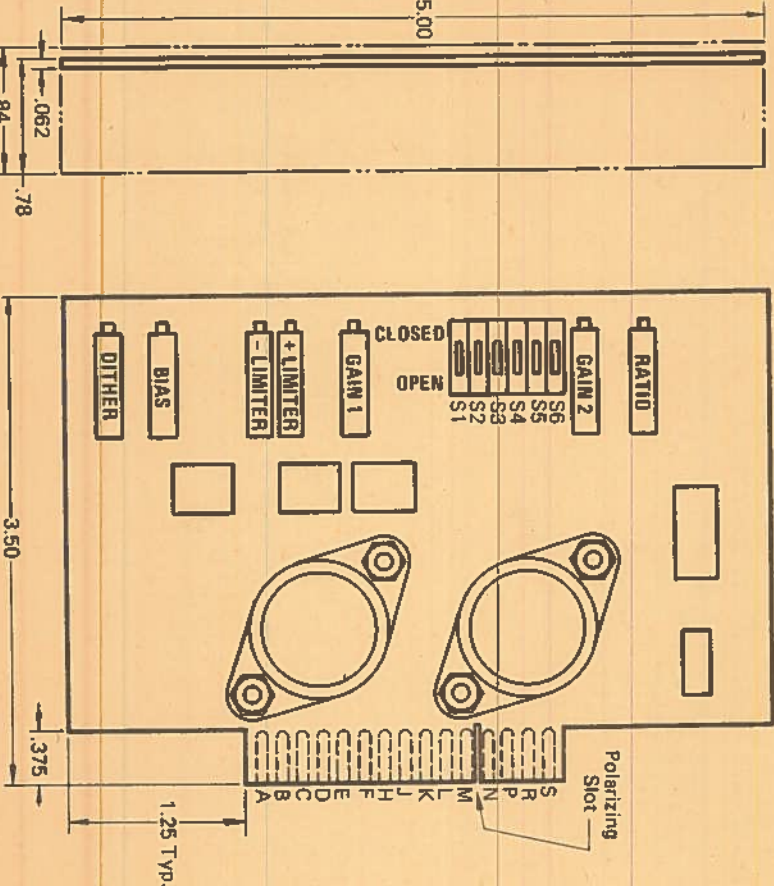
The EM-D-20 amplifier can be plugged into either the EMRS-A-10 single module power supply or the EMP-A-20 four module power supply.

The module consists of a power output stage and a general purpose voltage amplifier. The voltage amplifier may be used independently or in conjunction with the power output stage.

Adjustment of current limiters and bias in the output stage permits the unit to drive single polarity servo valves, bipolar servo valves or other electrically modulated valves.

The voltage amplifier stage may be set up as either a linear or an integrating amplifier, depending on the setting of internal switches. Other switches allow selection of a low or high gain range and an output limiting for velocity systems. An integrator reset circuit and an output saturation limiter are also provided.

**Mechanical**



Note: Switch contacts are closed when depressed side of switch is positioned toward edge of the board.

**Specifications**

**Power Stage (Combined power output and power preamp stages)**

Output (at terminals 1 and 2)	±600 mA into 20 ohm load
Bias Range	±400 mA
Gain Range	110 to 1520 mA/volt
Dither Range	0 to 40 mA
Drift due to Temperature	Less than 0.2 mA/°F at maximum gain
Drift Versus Supply Voltage	Less than 1 mA/volt at maximum gain at null
Warm Up Drift (30 minutes)	Less than 2 mA
Drift vs. Time (24 hours)	Less than 1 mA
Frequency Response	3 dB down at 300 Hz, max. gain and ±45 mA

**Power Preamp Stage**

Output (at terminal 7)	±6 volts, ±0.5 mA
Gain	1 to 13.8 V/V
Limiting	Adjustable from ±6 volts to 0

**Voltage Amplifier Stage**

Output (at terminal 6)	±8 volts at 2 mA
Gain Range with Ratio Potentiometer at Center	
Linear	Low Range 0.08 V/V to 1.09 V/V
Integrating	High Range 0.49 V/V to 6.7 V/V
Integrating	Low Range 1.5 V/sec-V to 21.4 V/sec-V
Integrating	High Range 9.6 V/sec-V to 133 V/sec-V
Drift due to Temperature	Less than 0.0010 V/°F at maximum gain
Drift Versus Supply Voltage	Less than 0.010 V/V at maximum gain
Warm-Up Drift (30 minutes)	Less than 0.02 volts
Drift vs. Time (24 hours)	Less than 0.02 volts
Frequency Response	3 dB down at 1000 Hz, max. gain

**Operational Notes**

**Limiter Ranges**

Limiter ranges are specified for the bias control at 0 mA. Limiter ranges are offset by the amount of bias when output is biased.

**Inversion**

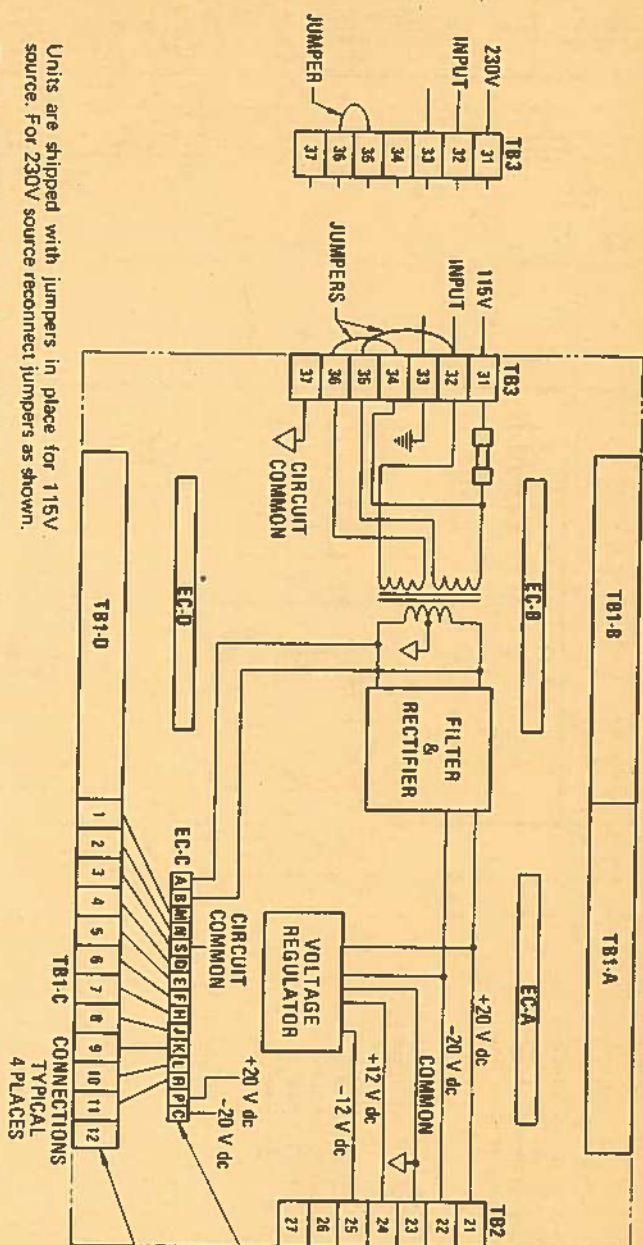
Each of the three stages of the amplifier shown in the block diagram inverts the input polarity. Positive input gives negative output and negative input gives positive output.

**Reset**

When terminal 11 is grounded an integrator reset function is activated causing the voltage amplifier output to go virtually instantaneously to zero or near zero. An open on terminal 11 restores normal operation. Gain of the voltage amplifier in the reset mode with ratio pot centered is .021 v/v with S5 closed and .003 v/v with S5 open.



## EMP-A-20 CIRCUIT DIAGRAM



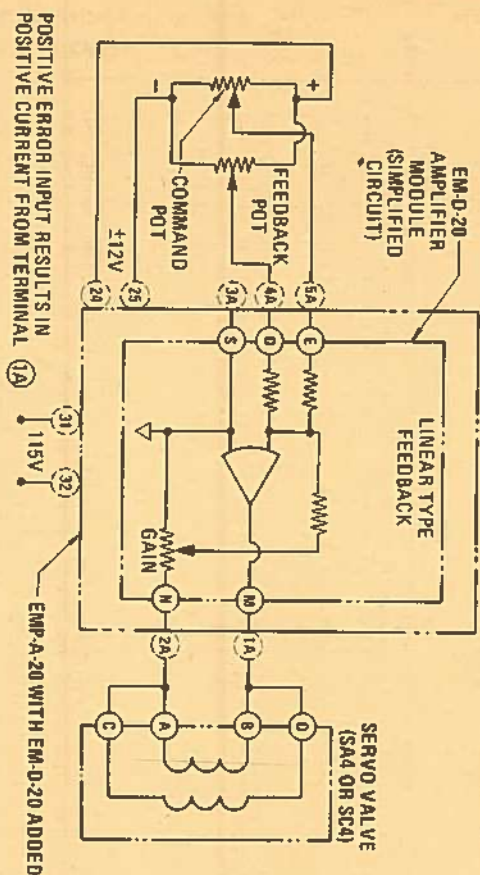
Connector: Amphenol 225-21521-103 or equivalent, 15 terminals on .156 centers. Contacts on inboard side of connector only. Board thickness .054 to .071.

Customer connections to be made with AWG No. 14 to No. 22 wire. Bare wire ends or spade lugs may be used. Terminal screw size: No. 6 - 32 x .250 long.

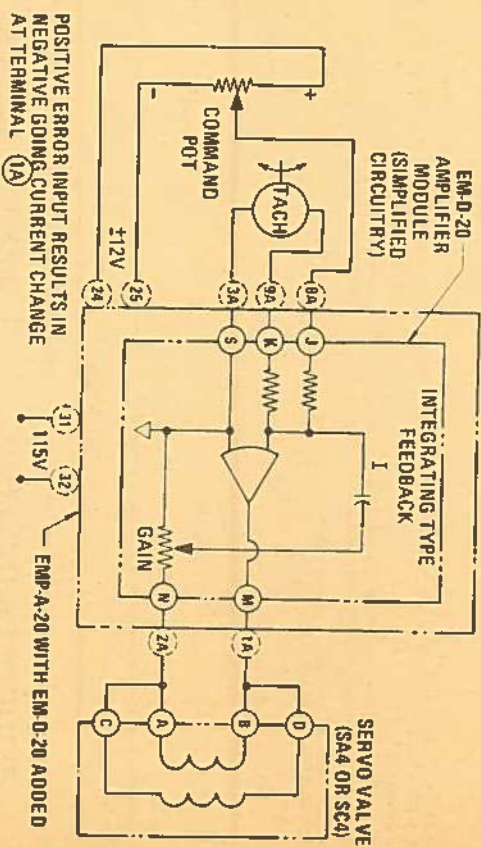
Units are shipped with jumpers in place for 115V source. For 230V source reconnect jumpers as shown. The circuit common connection at terminals 23 and 37, and at terminals 3A, 3B, 3C, and 3D are connected together and are isolated from the ground connection on terminal 33.

## TYPICAL POSITIONAL CONTROL CIRCUIT

See drawing 519720 for details on EM-D-20 Amplifier.



## TYPICAL VELOCITY CONTROL CIRCUIT





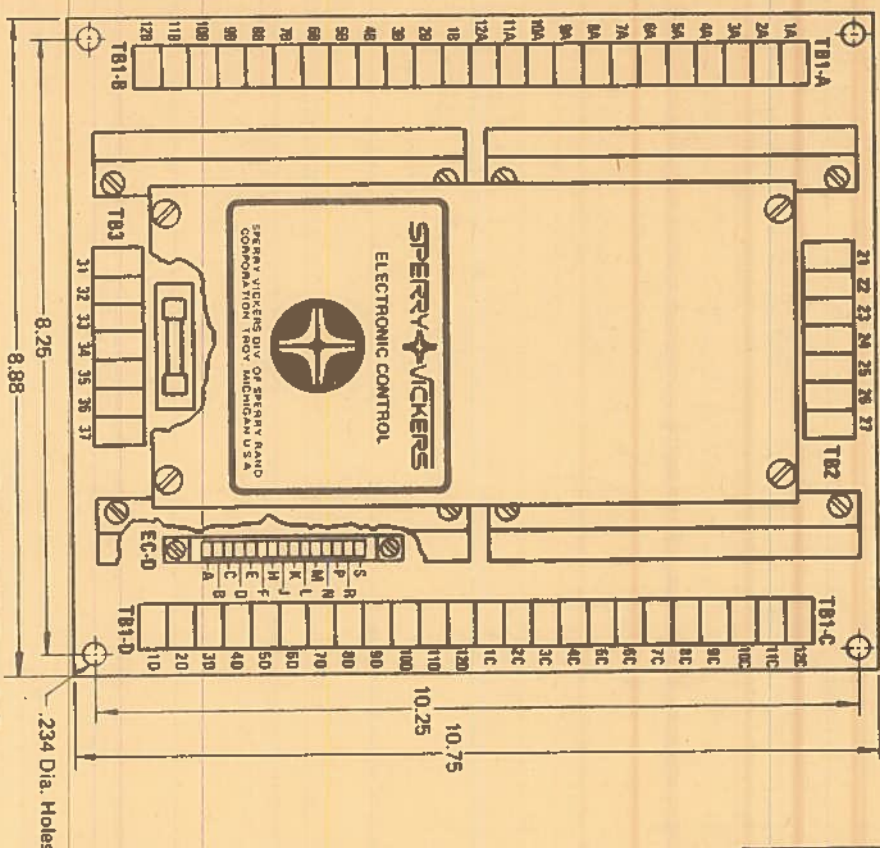
**SPEIRY VICKERS**  
TROY, MICHIGAN 48064

**ELECTRONIC  
POWER  
SUPPLY**

**REGULATED**

**MODEL  
EMP-A-20**

**DWG. NO.  
519700**



**SPEIRY VICKERS**

**POWER SUPPLY PLATE**

**MODEL EMP-A-20**

**Application**

This power supply unit is used with Sperry Vickers electronic control modules in electro-hydraulic control systems. It provides the means for mounting up to four modules, supplying them with the proper excitation voltages, and connecting them to external circuit components through terminal strips. In addition, a highly regulated  $\pm 12$  volt power supply circuit is included for excitation of command and feedback circuit components.

**Specifications**

**General**

Input Voltage..... 115/230 V ac  $\pm 10\%$   
Input Frequency..... 50/60 Hz  
Circuit Protection..... 1 A Time Delay Fuse on Input Power Line  
Ambient Temperature Range..... 0 - 65°C

**Main Supply**

Output Voltage (No Load).....  $\pm 20$  V dc  
Output Current Total..... 2.5 A dc  
Maximum Ripple..... 0.6 V RMS  
Line Regulation (10% Line Change)..... 12%  
Load Regulation (0 - 2.5A Output Current Change)..... 12%

**Regulated Supply (Includes Current Limiting and Thermal Shutdown Protection)**

Output Voltage..... +12 V.....  $\pm 0.6$  V  
..... -12 V.....  $\pm 0.6$  V  
Output Current Per Leg..... 200 mA  
Line Regulation ( $\pm 10\%$  Line Change)..... 0.05 V  
Load Regulation (0 - 40 mA Output Current)..... 0.03 V  
Temp. Coefficient..... 0.002 V/°C  
Drift After 30 minutes..... 0.03 V

**Mechanical**

Weight..... 9 Lbs.

(DIMENSIONS SHOWN IN INCHES)

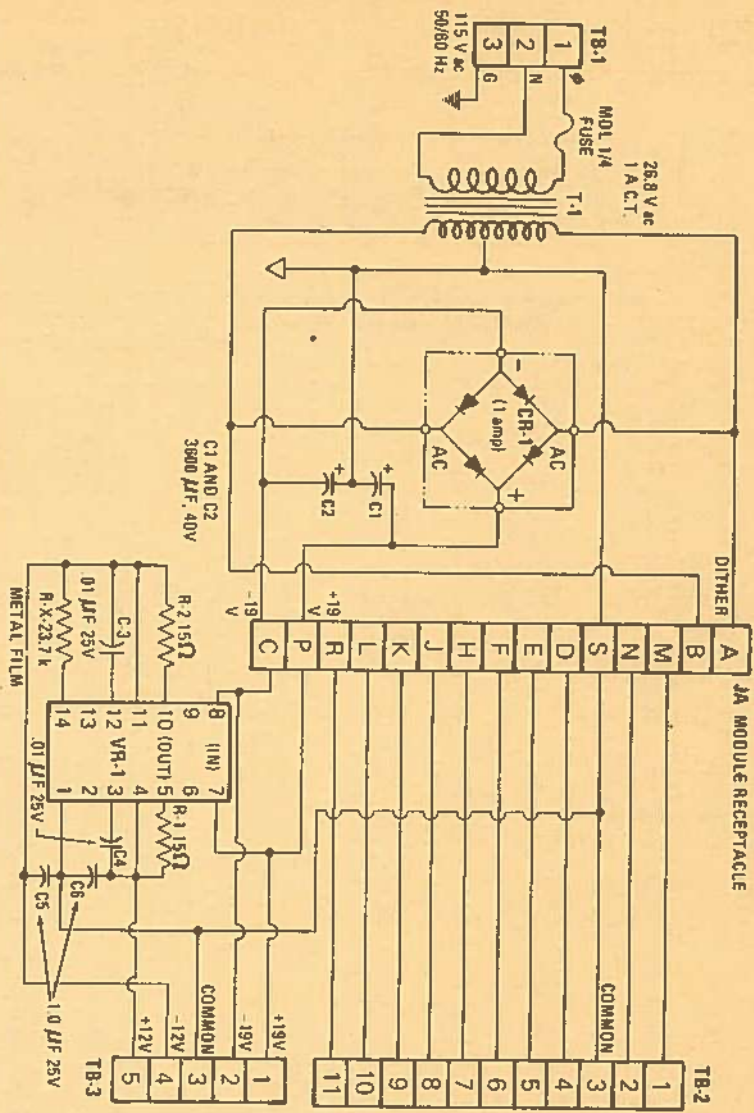
RELEASED 2-1-78

519700

5 SEC



# EMRS-A-10 POWER SUPPLY CIRCUIT DIAGRAM



## EM-D-20 AMPLIFIER ADJUSTMENTS POTENTIOMETER SETTINGS

POT	SERVO VALVE	
	SA4, SC4	SF4
DITHER	5 - 20%	5 - 20%
BIAS	ZERO MA OUT AT ZERO INPUT	200 MA OUT AT ZERO INPUT
± LIMITERS	± 300 MA	400 MA FOR ONE ZERO MA FOR OTHER
GAIN 1	AS REQUIRED	AS REQUIRED
GAIN 2	AS REQUIRED	AS REQUIRED
RATIO	AS REQUIRED	AS REQUIRED

### SWITCH SETTINGS



TYPICAL POSITIONAL CONTROL

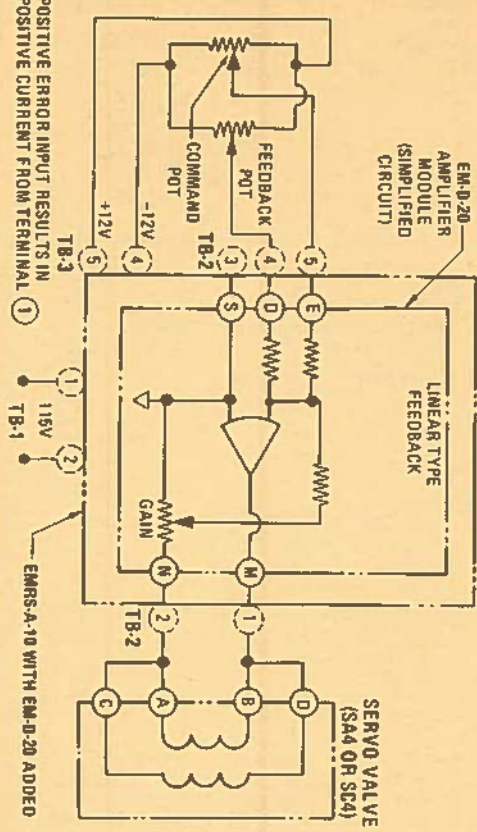


TYPICAL VELOCITY CONTROL

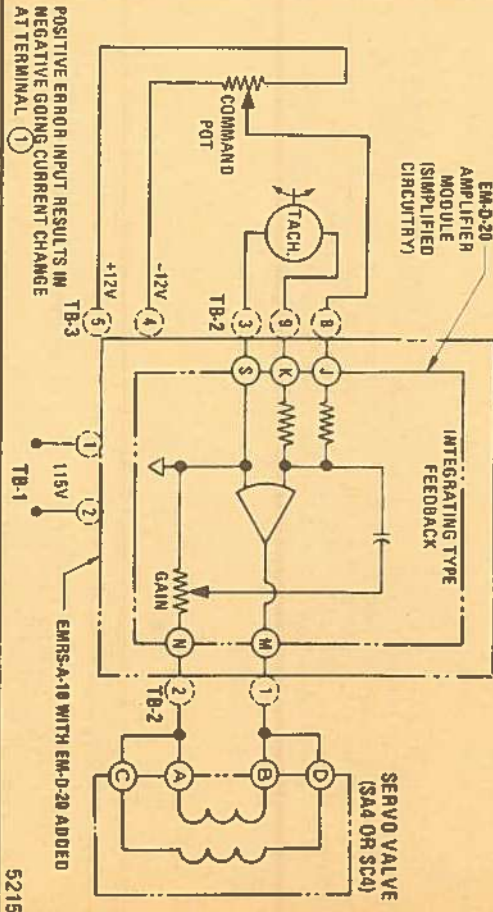
DARKENED AREA REPRESENTS DEPRESSED SIDE OF SWITCH. EXAMPLE: SWITCHES 4 AND 5 ARE OPEN IN BOTH TYPES OF CONTROL.

## TYPICAL POSITIONAL CONTROL CIRCUIT

See drawing 519720 for details on EM-D-20 Amplifier.



## TYPICAL VELOCITY CONTROL CIRCUIT





**SPEERRY VICKERS**  
TROY, MICHIGAN 48064

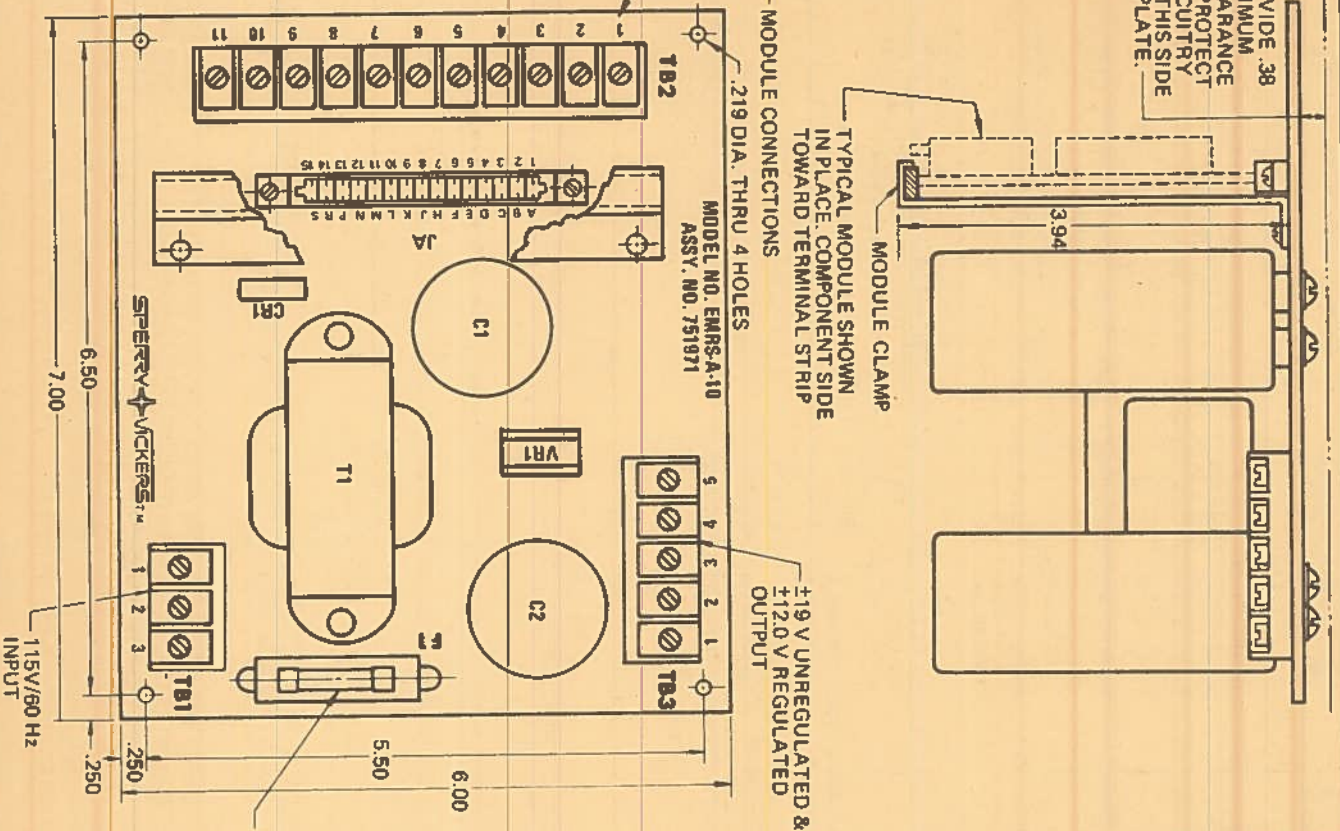
PROVIDE .38  
MINIMUM  
CLEARANCE  
TO PROTECT  
CIRCUITRY  
ON THIS SIDE  
OF PLATE.

**ELECTRONIC  
POWER  
SUPPLY**

**REGULATED**

**MODEL  
EMRS-A-10**

**DWG. NO.  
521540**



**APPLICATION**

THIS POWER SUPPLY UNIT IS USED WITH SPEERRY VICKERS ELECTRONIC CONTROL MODULES IN ELECTRO-HYDRAULIC CONTROL SYSTEMS. IT PROVIDES THE MEANS FOR MOUNTING ONE MODULE, SUPPLYING IT WITH THE PROPER EXCITATION VOLTAGES, AND CONNECTING IT TO EXTERNAL CIRCUIT COMPONENTS THROUGH A TERMINAL STRIP. IN ADDITION, A HIGHLY REGULATED  $\pm 12$  VOLT POWER SUPPLY CIRCUIT IS INCLUDED FOR EXCITATION OF COMMAND AND FEEDBACK CIRCUIT COMPONENTS. A SEPARATE TERMINAL STRIP IS PROVIDED FOR CONNECTIONS TO THIS CIRCUIT SECTION.

**SPEERRY VICKERS**  
POWER AND MOTION  
CONTROL SYSTEMS

**ELECTRONIC  
POWER SUPPLY  
(REGULATED)**

**MODEL EMRS-A-10**

**SPECIFICATIONS**

<b>INPUT - TB-1</b>		
INPUT VOLTAGE	115 V ac	
INPUT FREQUENCY	60 Hz	
CIRCUIT PROTECTION	3AG 1/4 amp SLOW BLOW FUSE ON INPUT POWER LINE	
<b>MAIN SUPPLY - TB-2</b>		
OUTPUT VOLTAGE (NO LOAD)	$\pm 19$ V dc	
OUTPUT CURRENT PER LEG	.6 A dc	
MAXIMUM RIPPLE	.5 V PEAK TO PEAK	
LINE REGULATION (10% LINE CHANGE)	10%	
LOAD REGULATION (0-.6A OUTPUT CURRENT CHANGE)	18%	
<b>REGULATED SUPPLY - TB-3</b>		
OUTPUT VOLTAGE	$\pm 12.0, \pm 0.8$ VOLTS dc	
OUTPUT CURRENT/LEG	25 mA	
SHORT CIRCUIT CURRENT/LEG	30.42 mA	
BALANCE	.07 V	
LINE REGULATION ( $\pm 10\%$ LINE CHANGE)	.08 V	
LOAD REGULATION (0-.03A OUTPUT CURRENT)	.25 V CHANGE	
TEMP REGULATION (0-65°C) FULL TEMP RANGE	-3.8 mV/°C	
TEMP COEFFICIENT	.12 V	
WARM-UP DRIFT	.012 V/DAY	
DRIFT AFTER 30 MINUTES		
SIZE	6 x 7 x 4" HIGH	
WEIGHT	2.44 LBS. (1.107 kg)	

REVISED 12-1-78

521540

h-11

5 SEC



**GENERAL USAGE**  
USED TO COUPLE THE SERIES SA406 SERVO VALVE TO MF-2008A PISTON TYPE SERVO MOTORS.

DESIGN PERMITS COMPACT COUPLING, THEREBY MINIMIZING THE VOLUME OF OIL UNDER COMPRESSION BETWEEN THE MOTOR AND SERVO VALVE.

CROSS LINE RELIEF VALVES PROVIDE MAXIMUM PROTECTION AGAINST MOTOR OVERLOAD. VISCOUS DAMPING IS CONTROLLED BY ADJUSTMENT OF THE CROSS LINE VARIABLE ORIFICE.

MAXIMUM OPERATING PRESSURE..... 3000 PSI  
VOLUME OF OIL UNDER COMPRESSION - PER SIDE..... 1.1 CU. IN.  
WEIGHT LBS. (APPROX.)..... 7.5

SERVO VALVE  
MANIFOLD

MODEL SERIES  
SVGM6-A-06-10

COUPLES SERVO VALVE  
TO PISTON MOTOR

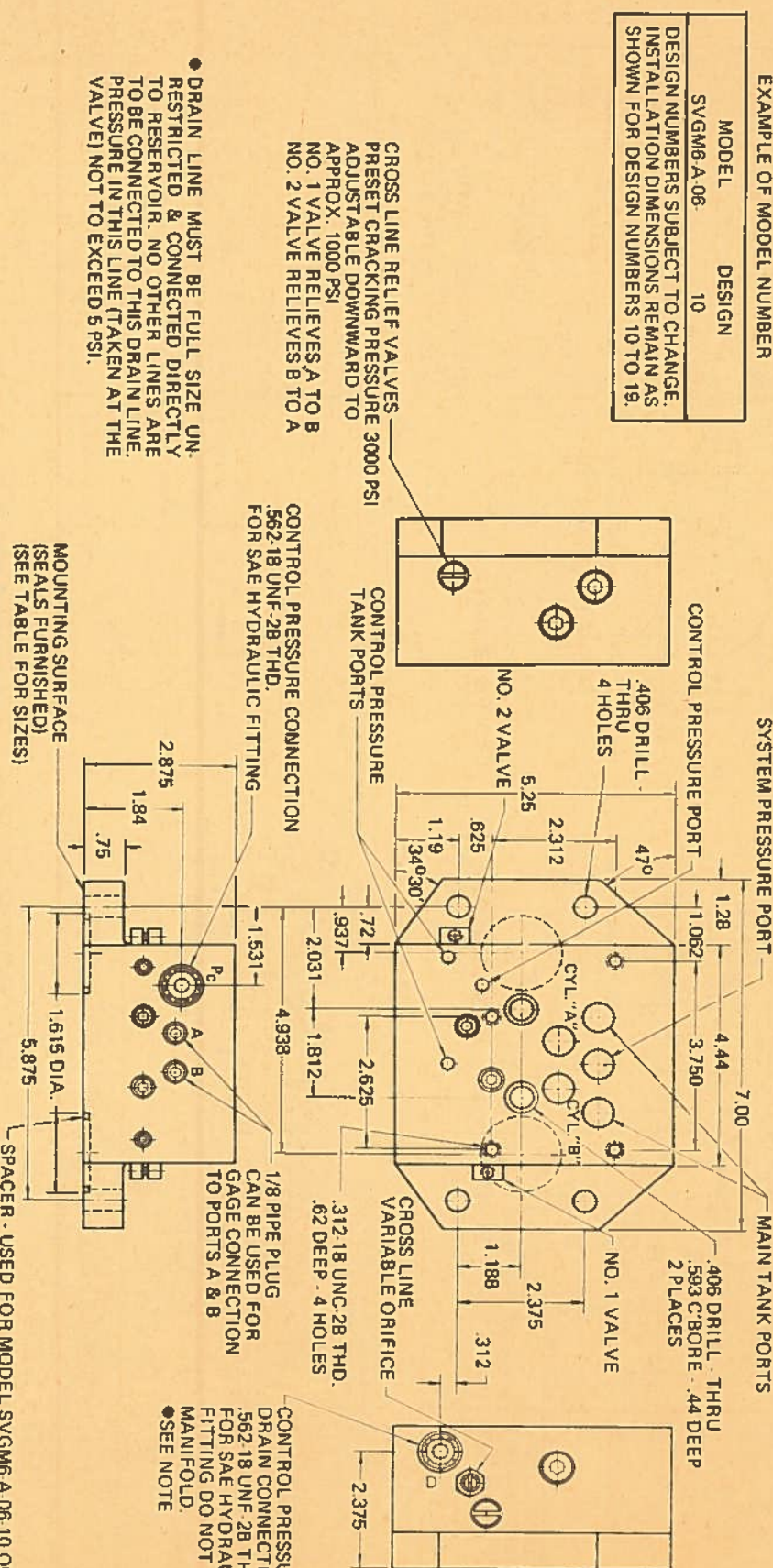
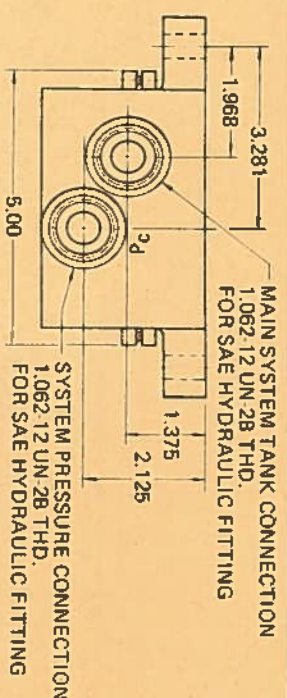
3/4" PIPING SIZE

DWG. NO.  
501560

**SPIERDY VICKERS**

**ELECTRO-HYDRAULIC  
SERVO VALVE MANIFOLD**

MODEL SERIES SVGM6-A-06-10  
FOR 3/4" PIPING



EXAMPLE OF MODEL NUMBER  
MODEL DESIGN  
SVGM6 A-06 10  
DESIGN NUMBERS SUBJECT TO CHANGE  
INSTALLATION DIMENSIONS REMAIN AS  
SHOWN FOR DESIGN NUMBERS 10 TO 19.

◆ DRAIN LINE MUST BE FULL SIZE UNRESTRICTED & CONNECTED DIRECTLY TO RESERVOIR. NO OTHER LINES ARE TO BE CONNECTED TO THIS DRAIN LINE. PRESSURE IN THIS LINE (TAKEN AT THE VALVE) NOT TO EXCEED 5 PSI.

REVISED 6-2-75

501560



MODEL SVGM1-✱-03-10

THE CROSS LINE RELIEF VALVES PROVIDE PEAK OVERLOAD PROTECTION FOR THE HYDRAULIC MOTOR. VISCOUS DAMPING CAN BE CON-

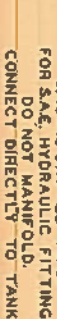
CROSS LINE RELIEF VALVES ARE ESPECIALLY RECOMMENDED FOR ANY

MAXIMUM OPERATING PRESSURE ..... 3000 P.S.I.

MAXIMUM OPERATING PRESSURE . . . . .	3000 P.S.I.
VOLUME OF OIL UNDER COMPRESSION - PER SIDE . . . . .	.72 CU. IN.
WEIGHT (APPROX.) . . . . .	3.7 LBS.

3  
2  
1  
0  
0  
0  
0  
0  
0

.300 DIA. FOR 13  
.987 DIA. C'BORE - .079 DEEP



✓ १३३

REVISED 7-15-63 RWS

**ICKERS INCORPORATE**

DETROIT, MICHIGAN, U.S.A.

## INSTALLATION DRAWING

THIS DRAWING NOT TO SCALE 6-5-58

1-222738



# GENERAL DATA

THESE VALVES PROVIDE THE ACCURATE FLOW MODULATION REQUIRED FOR FAST AND PRECISE CLOSED LOOP CONTROL OF POSITION, VELOCITY AND ACCELERATION. SUPPLY PRESSURE IS USED AS A SOURCE OF INTERNAL CONTROL. THEREBY ELIMINATING THE NEED FOR A SEPARATE CONTROL PRESSURE SOURCE. POLARITY HAS NO EFFECT ON VALVE OPERATION. VALVE OUTPUT IS DETERMINED BY CURRENT MAGNITUDE ONLY FOR ANY GIVEN PRESSURE DROP ACROSS VALVE. CURRENTS ABOVE NULL PROVIDES FLOW FROM PORT "B". CURRENTS BELOW NULL PROVIDES FLOW FROM PORT "A". SEE DRAWING 501600 IN THIS SECTION FOR POWER SUPPLY AND AMPLIFIER DATA.

SUPPLY PRESSURE..... SEE MODEL CODING

CONTROL PRESSURE..... INTERNAL

FLOW RATING..... SEE MODEL CODING

QUIESCENT FLOW (@ 1000 PSI)..... LESS THAN 1.0 GPM

OPERATING TEMPERATURE..... 120° F. NOMINAL  
150° F. MAX.

FLUID RECOMMENDATION..... PETROLEUM BASE  
RANGING BETWEEN 150 SSU (LIGHT) AND 225 SSU (MEDIUM) AT 100° F. REFER TO DATA SHEET 286S (SECTION L) FOR HYDRAULIC FLUID RECOMMENDATIONS.

FILTRATION RECOMMENDED..... NOT GREATER THAN 25 MICRON FULL FLOW

DITHER, REQUIRED FOR OPTIMUM PERFORMANCE..... 50-60 HZ

HYSTERESIS (AROUND NULL POINT)..... LESS THAN 2% WITH DITHER

NULL CURRENT (NOMINAL)..... 200 MA

PRESSURE NULL SHIFT (NOMINAL)..... .035 MA/PSI

TEMPERATURE NULL SHIFT (NOMINAL)..... 0.25 MA/°F.

DEADBAND AROUND NULL..... NONE

GAIN SLOPE AT NULL (NOMINAL)..... .08 GPM/MA

NULL PRESSURE GAIN (NOMINAL)..... SF4-100-30 600 PSI/MA  
SF4-140-20 350 PSI/MA

CURRENT REQUIRED..... 0-400 MA

POWER REQUIRED..... 3.2 WATTS

COIL RESISTANCE (NOMINAL)..... 20 OHMS

TANK CONNECTION

THE TANK CONNECTION MUST BE PIPED INDEPENDENTLY AND DIRECTLY TO THE RESERVOIR AT ATMOSPHERIC PRESSURE THROUGH A SURGE-FREE DRAIN LINE TO AVOID VALVE MALFUNCTION OR ACTUATOR COVER FAILURE.

WEIGHT LBS. (APPROX.)

VALVE..... 9  
SUBPLATE..... 3

## MODEL CODE \*

SERVO VALVE

F-TYPE  
FLAPPER-NOZZLE

4-WAY

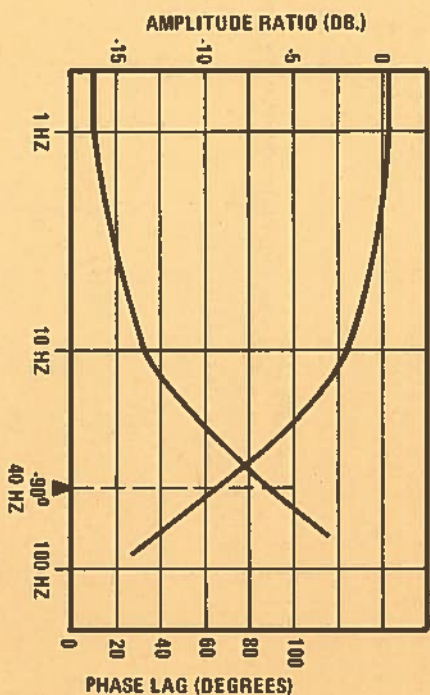
APPROXIMATE FLOW  
@ 1000 PSI DROP &  
RATED CURRENT  
140 - 14 GPM  
100 - 10 GPM

SF4 - 140 - 20 - 902 - 10  
DESIGN NUMBER  
SUBJECT TO CHANGE. INSTALLATION DIMENSIONS REMAIN AS SHOWN FOR DESIGN NUMBERS 10 THRU 19.  
NOMINAL COIL RESISTANCE  
20 OHM  
SUPPLY PRESSURE  
20 - 2000 PSI  
30 - 3000 PSI

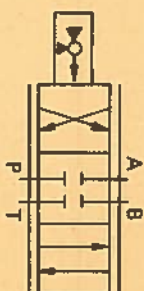
## \* NOTE:

THE 14 GPM VALVE CAN ONLY BE OBTAINED FOR A 2000 PSI SUPPLY PRESSURE, AND THE 10 GPM VALVE CAN ONLY BE OBTAINED FOR A 3000 PSI SUPPLY PRESSURE.

## TYPICAL PERFORMANCE CURVE



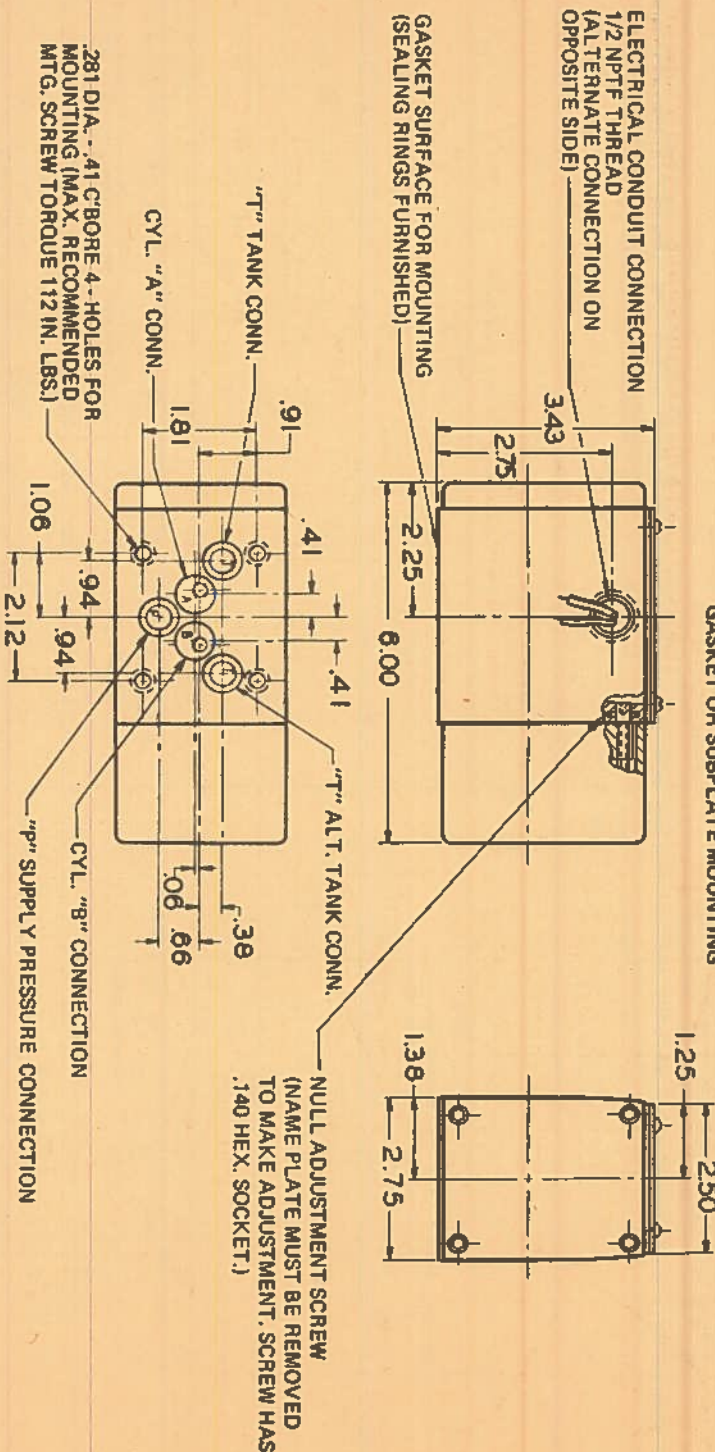
STANDARD GRAPHICAL SYMBOL  
FOR FLUID POWER DIAGRAMS





# VICKERS® ELECTRO-HYDRAULIC TWO STAGE SERVO VALVE

MODEL SERIES SF4  
GASKET OR SUBPLATE MOUNTING



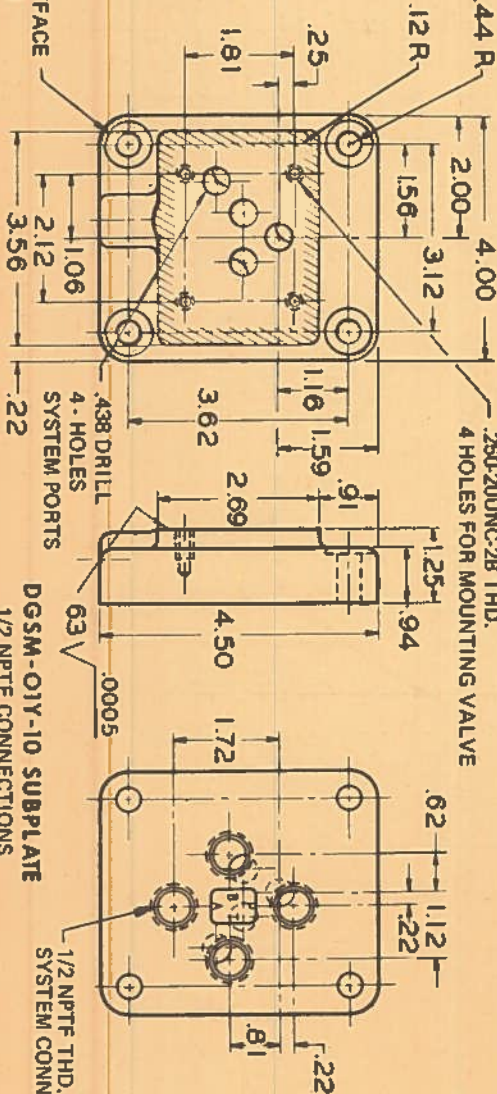
**SUBPLATES & BOLT KITS**  
VALVES, SUBPLATES AND MOUNTING BOLTS MUST BE ORDERED SEPARATELY.

EXAMPLE: ONE (1) SF4-140-20-002-10 VALVE  
ONE (1) DGSM-O1Y-10 SUBPLATE  
ONE (1) BKSF4-648 BOLT KIT

SIDE CONNECTION SUBPLATES ARE ALSO AVAILABLE WITH 3/8" & 1/2" NPTF THREADS. SEE DRAWING NO. 522600.

WHEN SUBPLATE IS NOT USED, A MACHINED PAD (AS INDICATED BY SUBPLATE SHADED AREA) MUST BE PROVIDED FOR MOUNTING; PAD MUST BE FLAT WITHIN .0005 INCH AND SMOOTH WITHIN 63 MICROINCH. MOUNTING BOLTS, WHEN PROVIDED BY CUSTOMER, SHOULD BE SAE GRADE 7, OR BETTER.

.406 D. THRU .81 D. SPOTFACE  
4 HOLES FOR MOUNTING



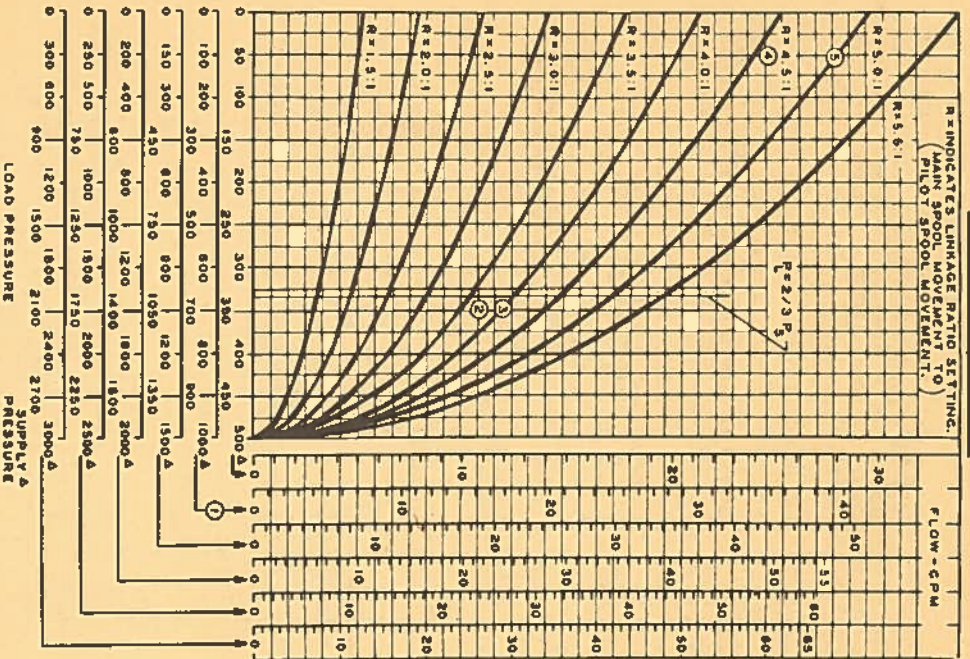
REVISED 1-3-72

DWG. NO. 501170



# TYPICAL PERFORMANCE CURVES SERIES SA4-06

## THEORETICAL CURVES



THE ABOVE CHARTS CAN BE USED AS A GUIDE FOR THE SELECTION OF NOMINAL LINKAGE RATIO. LINKAGE RATIO IS EASILY ADJUSTED IN THE FIELD, IF REQUIRED, TO MEET SPECIFIC REQUIREMENTS. REFER TO MAINTENANCE BULLETIN 1-3080S.

CONSULT YOUR SPERRY VICKERS APPLICATION ENGINEER IN THE SELECTION OF LINKAGES FOR FLOWS GREATER THAN 50 GPM WITH THE SA4-06 VALVE OR WHERE SERVO VALVE RESPONSE IS CRITICAL.

### EXAMPLE PROBLEM FOR SELECTING LINKAGE RATIO SETTING

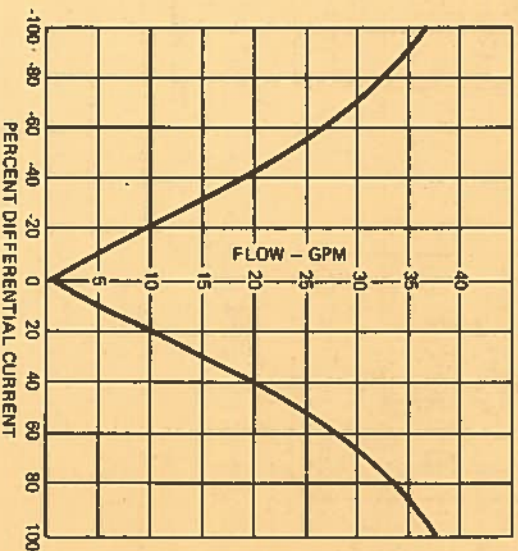
AVAILABLE SUPPLY PRESSURE = 1000 PSI  
CUSTOMER LOAD SPECS. 15 GPM @ 700 PSI (WORK LOAD) - 35 GPM @ 100 PSI (TRAVERSE)

SOLUTION: STEPS MARKED Ⓢ ON GRAPH

1. LOCATE PRESSURE - FLOW SCALES (1000)
2. FIND INTERSECTION OF WORK LOAD PRESSURE AND FLOW CO-ORDINATES (P<sub>L</sub> = 700 Q = 15)
3. MOVE UP TO NEAREST CURVE R = 4.0:1
4. FIND INTERSECTION POINT OF TRAVERSE CO-ORDINATES (P<sub>T</sub> = 100 Q = 35)
5. MOVE UP TO NEAREST CURVE R = 5.0:1. USE 5.0:1 LINKAGE RATIO TO MEET BOTH SPECS.

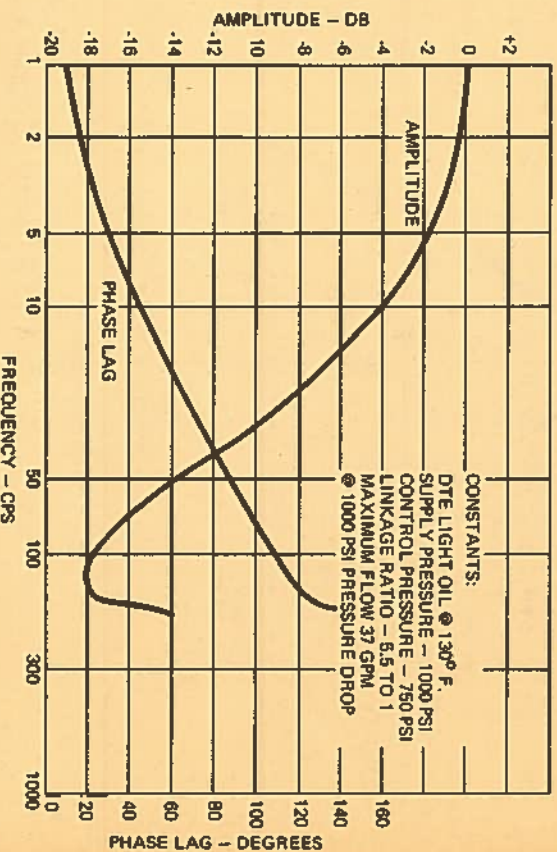
## TYPICAL FLOW

CONSTANTS:  
PRESSURE DROP 1000 PSI  
CONTROL PRESSURE 750 PSI  
VALVE FEEDBACK RATIO 5.5:1  
DTE LIGHT OIL @ 130° F.



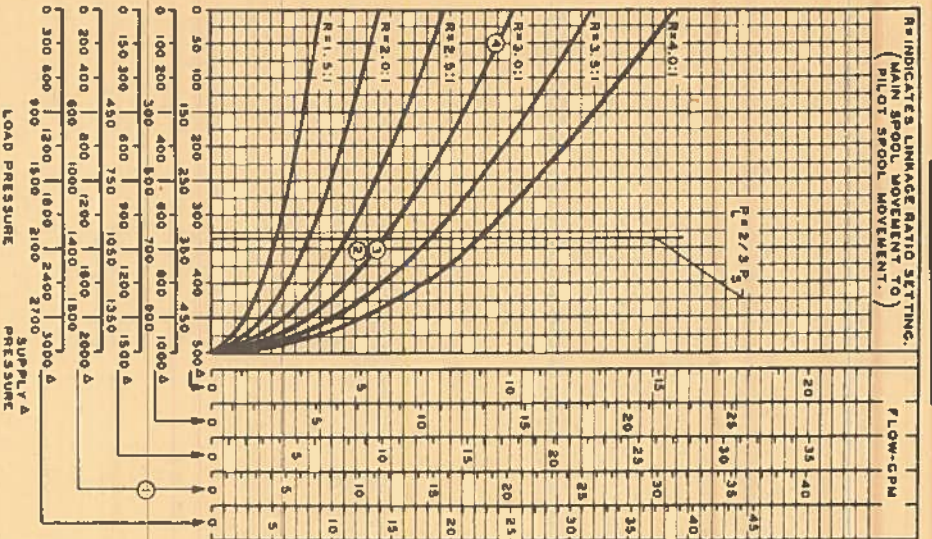
## SINUSOIDAL RESPONSE CHARACTERISTICS

SERVO VALVE WITH 3 WATT TORQUE MOTOR





## THEORETICAL CURVES

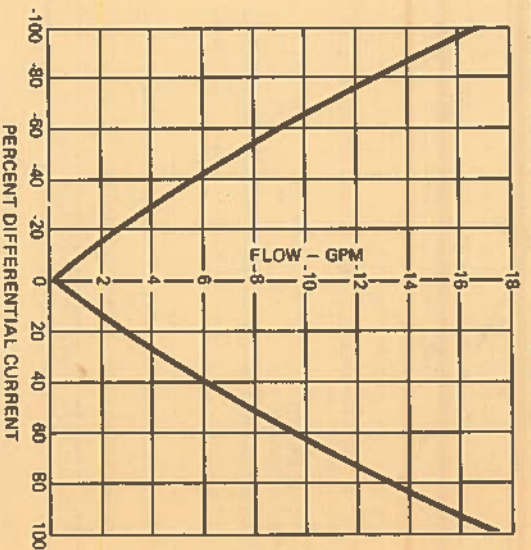


## TYPICAL PERFORMANCE CURVES

SERIES SA4-03

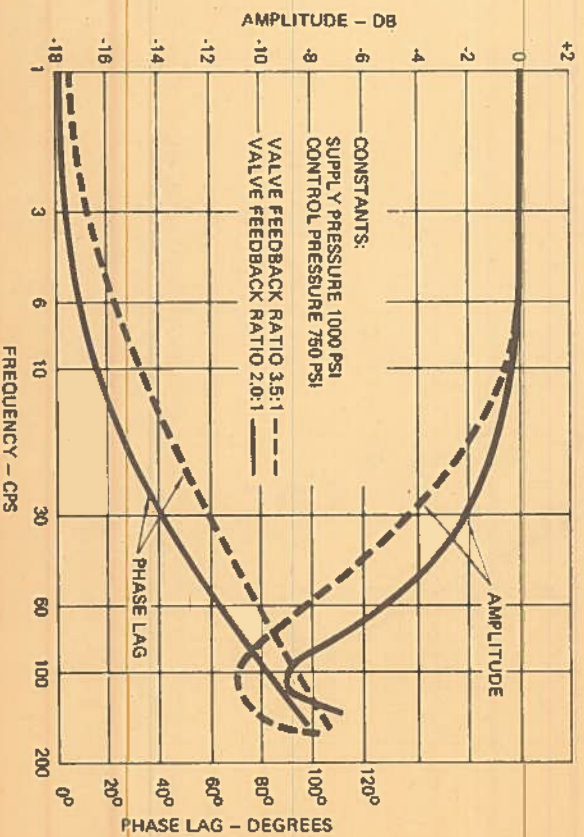
### TYPICAL FLOW

CONSTANTS:  
PRESSURE DROP 1000 PSI  
CONTROL PRESSURE 750 PSI  
VALVE FEEDBACK RATIO 3.5:1  
DTE LIGHT OIL @ 130° F.



### SINUSOIDAL RESPONSE CHARACTERISTICS

SERVO VALVE WITH 3 WATT TORQUE MOTOR



THE ABOVE CHARTS CAN BE USED AS A GUIDE FOR THE SELECTION OF NOMINAL LINKAGE RATIO. LINKAGE RATIO IS EASILY ADJUSTED IN THE FIELD. IF REQUIRED, TO MEET SPECIFIC REQUIREMENTS. REFER TO MAINTENANCE BULLETIN 1-3080-S.

CONSULT YOUR SERRA VICKERS APPLICATION ENGINEER IN THE SELECTION OF LINKAGES FOR FLOWS GREATER THAN 20 GPM WITH THE SA4-03 VALVE OR WHERE SERVO VALVE RESPONSE IS CRITICAL.

### EXAMPLE PROBLEM FOR SELECTING LINKAGE RATIO SETTING

AVAILABLE SUPPLY PRESSURE = 2000 PSI

CUSTOMER LOAD PRESSURE = 1400 PSI MAXIMUM; 200 PSI FOR RAPID TRAVERSE

DESIRED MAXIMUM FLOW UNDER LOAD = 10.0 GPM

RAPID TRAVERSE FLOW REQ. = 18 GPM

SOLUTION: STEPS MARKED ⊗ ON GRAPH

1. LOCATE PROPER PRESSURE AND FLOW SCALE (2000 PSI)

2. FIND INTERSECTION POINT OF LOAD PRESSURE AND FLOW CO-ORDINATES (P = 1400, Q = 10.0)

3. MOVE UP TO NEAREST CURVE R = 3.0:1

4. MOVE ALONG CURVE TO LOW PRESSURE (200) POINT. (Q = 19.3). USE 3.0:1 RATIO.



# GENERAL DATA

PROVIDES THE EXTREMELY ACCURATE FLOW MODULATION REQUIRED FOR FAST AND PRECISE CLOSED LOOP CONTROL OF POSITION, VELOCITY, AND ACCELERATION. PROVEN PERFORMANCE ON MACHINE TOOLS, INDUSTRIAL PROCESSING EQUIPMENT, AND MISSILE HANDLING APPLICATIONS.

EXCEPTIONAL SIMPLICITY AND RELIABILITY... ONLY FOUR MOVING PARTS REQUIRED FOR THIS TWO-STAGE SPOOL CONSTRUCTION. A MECHANICAL FEEDBACK LINKAGE WITH A UNIQUE VARIABLE FULCRUM PROVIDES OPTIMUM FLEXIBILITY TO VARIOUS CONDITIONS OF FLOW, RESPONSE, AND PRESSURE.

**SUPPLY PRESSURE (MAXIMUM RECOMMENDED)**..... 3000 PSI

**CONTROL PRESSURE**..... 200 TO 1000 PSI

**RATED FLOW AT 1000 PSI PRESSURE DROP AND RATED CURRENT (SEE TYPICAL CURVES)**

SA4-03 SERIES..... 17 GPM @ 3.5 TO 1 RATIO  
SA4-06 SERIES..... 37 GPM @ 5.5 TO 1 RATIO

**OPERATING TEMPERATURE (MAXIMUM)**..... TO 170° F.

**FLUID RECOMMENDATION**..... PETROLEUM BASE, 150 SSU @ 100° F.  
(SEE 1.286-S SECTION L)

**FILTRATION (REQUIRED)**..... 10 MICRONS FULL FLOW

**DITHER (REQUIRED FOR OPTIMUM PERFORMANCE)**..... 60 TO 400 CPS

**HYSTERESIS**..... LESS THAN 2%

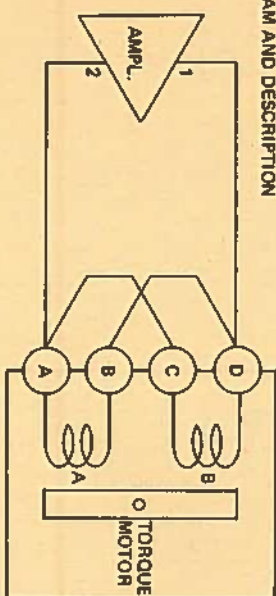
**DEAD BAND**..... 0.2 OPEN LOOP WITH DITHER

**TEMPERATURE NULL SHIFT (100° F. TO 150° F.)**..... .03%/° F.

## TORQUE MOTOR CHARACTERISTICS

COIL RESISTANCE (OHMS/COIL) 40 OHMS (OTHER COIL VALUES AVAILABLE UPON REQUEST)  
INPUT CURRENT..... 300 MA  
POWER REQUIRED FOR SERIES OR PARALLEL CIRCUITS..... 1.8 WATTS

## WIRING DIAGRAM AND DESCRIPTION



WHEN AMPLIFIER OUTPUT AT TERMINAL 1,  
IN RESPECT TO TERMINAL 2, IS

+ POSITIVE

- NEGATIVE

SERVO VALVE OUTPUT FLOW  
INCREASES AT PORT

B

A

WEIGHT LBS. (APPROX.)

VALVE-SA4-03..... 15  
SUBPLATES-SVGM2-03..... 13  
SVGM2-06..... 17

## TYPICAL MODEL CODE

SERVO VALVE

TYPE A  
TWO-STAGE SLIDING SPOOL

4-WAY

NOMINAL PIPE SIZE

03 - 3/8"  
06 - 3/4"

LINKAGE RATIO

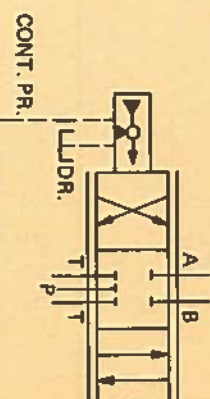
55 - 5.5 TO 1  
50 - 5.0 TO 1  
45 - 4.5 TO 1  
40 - 4.0 TO 1  
35 - 3.5 TO 1

S A 4 - 03 - 35 - 004 - 10

DESIGN NUMBER SUBJECT TO  
CHANGE. INSTALLATION DIM-  
ENSIONS REMAIN AS SHOWN  
FOR DESIGN NUMBERS 10 THRU  
19.

NOMINAL RESISTANCE (OHMS)  
004 - 40  
OTHER COIL VALUES AVAILABLE  
UPON REQUEST

## STANDARD GRAPHICAL SYMBOL FOR FLUID POWER DIAGRAMS









OPERATING CONDITIONS

SUPPLY PRESSURE (MAXIMUM)..... 1000 PSI  
 OPERATING TEMPERATURE (MAXIMUM)..... 170° F.  
 FILTRATION - FULL FLOW..... 10 MICRON  
 DITHER (REQUIRED)..... 60 TO 400 CPS

NOMINAL CHARACTERISTICS

MAX. FLOW AT 1000 PSI PRESSURE DROP..... 3-3/4 GPM  
 HYSTERESIS..... LESS THAN 2%  
 PRESSURE DEADBAND..... LESS THAN 1%

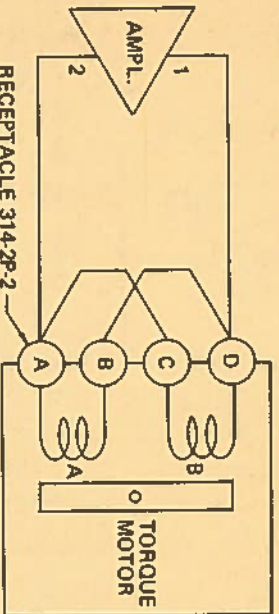
DRAIN

DRAIN MUST BE PIPED DIRECTLY TO TANK THROUGH A SURGE FREE LINE SO THERE WILL BE NO BACK PRESSURE AT THE VALVE DRAIN PORT. TRANSIENT PRESSURE MUST NOT EXCEED 5 PSI.

TORQUE MOTOR CHARACTERISTICS

COIL RESISTANCE (OHMS/COIL) 40 OHMS - OTHER COILS AVAILABLE ON REQUEST.  
 INPUT CURRENT..... 300 mA  
 POWER REQUIRED FOR SERIES OR PARALLEL CIRCUITS..... 1.8 WATTS

WIRING DIAGRAM AND DESCRIPTION



WHEN AMPLIFIER OUTPUT AT TERMINAL 1, IN RESPECT TO TERMINAL 2, IS

+ POSITIVE	SERVO VALVE OUTPUT FLOW INCREASES AT PORT A
- NEGATIVE	B

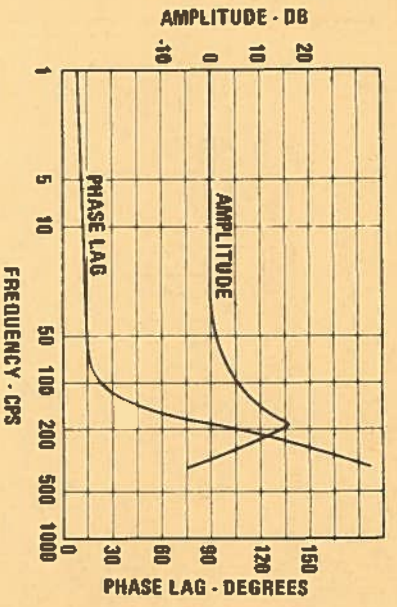
WEIGHT LBS. (APPROX.)

VALVE..... 8  
 SUBPLATE..... 4-1/2

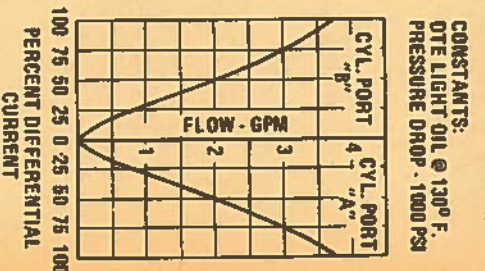
MODEL CODE

SERVO VALVE..... S C4 - 03 - 004 - 20  
 TYPE C SINGLE STAGE.....  
 NOMINAL PIPE SIZE.....  
 NOMINAL PIPE SIZE.....  
 DESIGN NUMBER SUBJECT TO CHANGE. INSTALLATION DIMENSIONS REMAIN AS SHOWN FOR DESIGN NUMBERS 20 THRU 29.  
 NOMINAL RESISTANCE (OHMS).....  
 004 - 40 OHMS - OTHER COILS AVAILABLE ON REQUEST

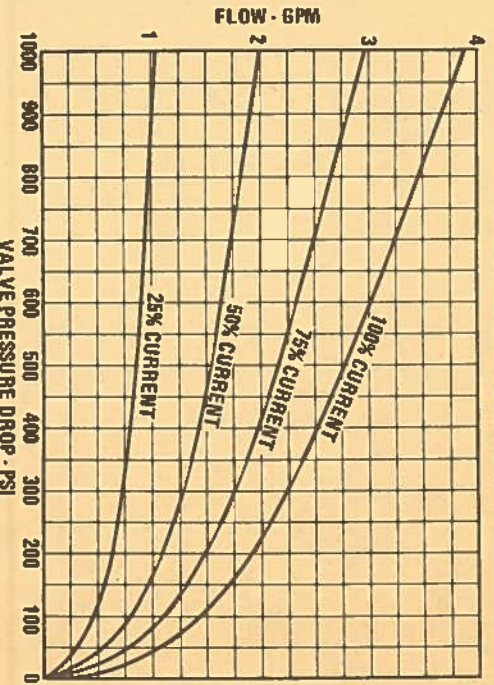
TYPICAL SINUSOIDAL FREQUENCY RESPONSE CHARACTERISTICS



TYPICAL FLOW CURVE



TYPICAL FLOW CHARACTERISTICS



STANDARD GRAPHICAL SYMBOL FOR FLUID POWER DIAGRAMS





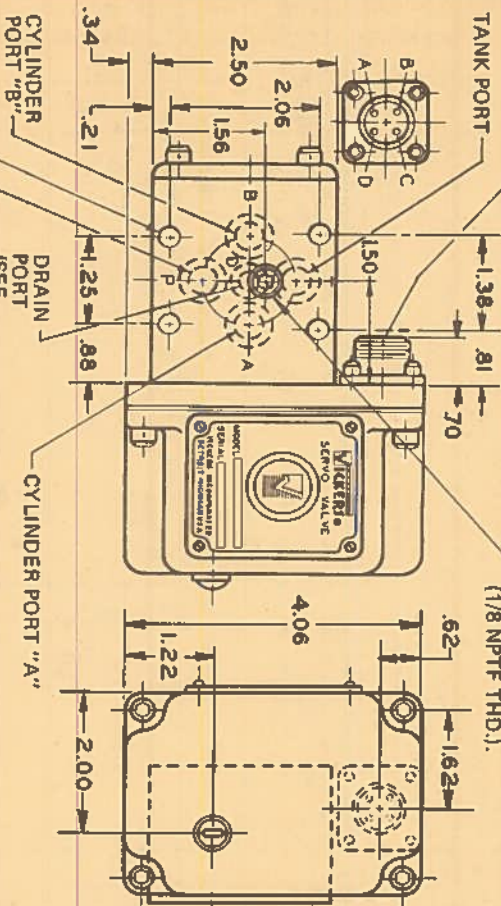
# **SPIERRE VICKERS** **ELECTRO-HYDRAULIC INDUSTRIAL SERVO VALVES**

SERIES SC4-03 SINGLE STAGE TYPE  
MANIFOLD OR SUBPLATE MOUNTING

**SPIERRE VICKERS**  
TROY, MICHIGAN 48064

8/5-20 NEF THREAD  
MODEL 314S-2P-2 RECEPTACLE  
MATES WITH CONNECTOR  
MS-3106A-14S-2S AND  
3057-6 CLAMP

AUXILIARY DRAIN CONNECTION  
(1/8 NPTF THD.)



.281 DIA. THRU 4 PLACES  
FOR MOUNTING - TIGHTEN  
MOUNTING SCREWS 30 TO  
40 INCH-POUNDS TORQUE

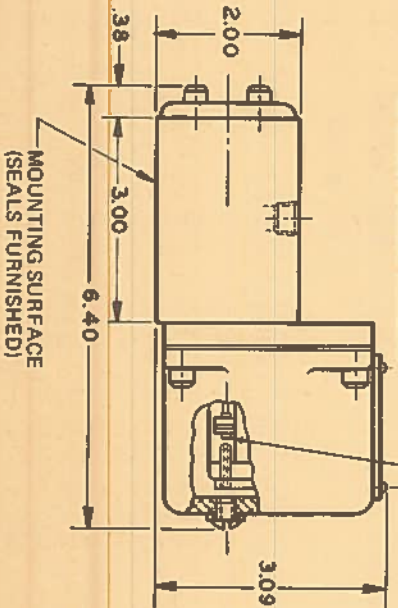
PRESSURE PORT

DRAIN PORT  
(SEE  
NOTES)

CYLINDER PORT "A"

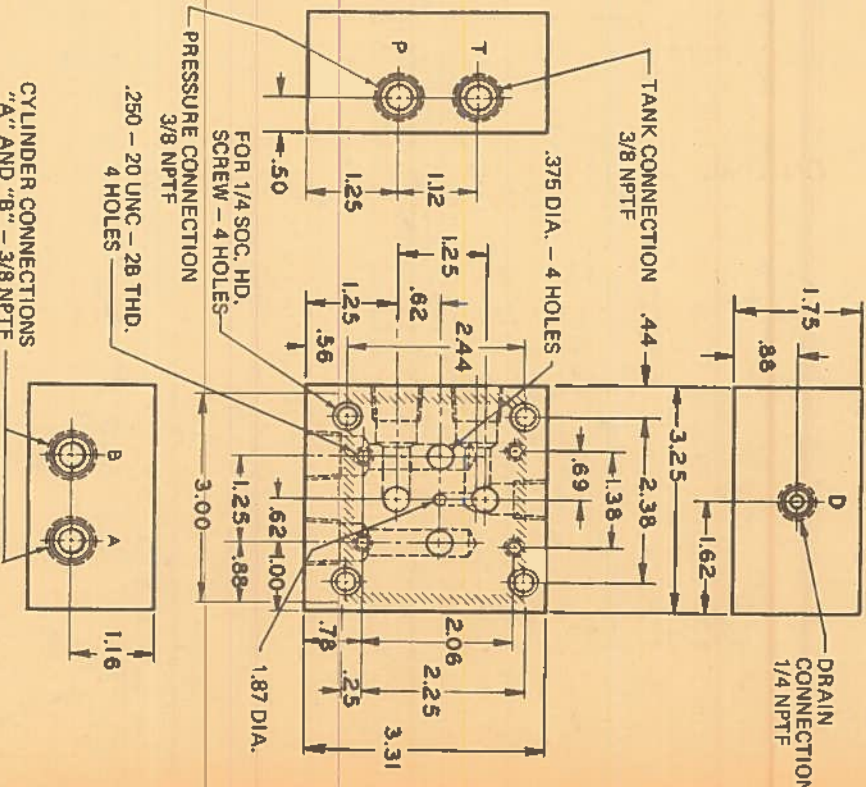
CYLINDER PORT "B"

NULL ADJUSTMENT  
USE .060 HEX. KEY



MOUNTING SURFACE  
(SEALS FURNISHED)

## **MOUNTING SUBPLATE**



.250 - 20 UNC - 28 THD.  
4 HOLES

FOR 1/4 SOC. HD.  
SCREW - 4 HOLES

PRESSURE CONNECTION  
3/8 NPTF

CYLINDER CONNECTIONS  
"A" AND "B" - 3/8 NPTF

SUBPLATES AND BOLT KITS  
VALVES, SUBPLATES AND MOUNTING BOLTS MUST BE ORDERED SEPARATELY.

EXAMPLE: ONE (1) SC4-03-004-20 SERVO VALVE  
ONE (1) SVGM3-03-10 SUBPLATE  
ONE (1) BKSC4-629 BOLT KIT

WHEN SUBPLATE IS NOT USED, A MACHINED PAD (AS INDICATED BY SUB-  
PLATE SHADES AREA) MUST BE PROVIDED FOR MOUNTING. PAD MUST BE  
FLAT WITHIN .0006 INCH AND SMOOTH WITHIN 63 MICRONS. MOUNTING  
BOLTS, WHEN PROVIDED BY CUSTOMER, SHOULD BE SAE GRADE 7, OR  
BETTER.

DWG. NO. 501400

MANIFOLD OR  
SUBPLATE  
MOUNTING

3/8 INCH  
PIPING SIZE

SC4 - 03 SERIES

INDUSTRIAL  
SERVO VALVES

TROY, MICHIGAN 48064

REVISED 1-2-76

501400



# INDEX SECTION H - SERVO VALVES AND ACCESSORIES

DESCRIPTION	MOUNTING & NOMINAL SIZE	DWG. NO.	PAGE NO.
-------------	----------------------------	----------	----------

Servo Valves - Single Stage

SC4-03 spool type

Subplate 3/8

501400

h - 1

Servo Valves - Two Stage

SA4-03/06 spool type, first stage  
SF4 flapper type, first stage

Subplate 3/8 and 3/4  
Subplate 1/8

501500  
501170

h - 3  
h - 7

Servo Accessories

SVGM1-03  
SVGM-06

Manifold 3/8  
Manifold 3/4

222738  
501560

h - 9  
h - 10

Electronic Control Components

EMRS-A-10 power supply for 1 module  
EMP-A-20 power supply for 4 modules  
EM-D-20 amplifier module  
EMCS\*-20 power supply for CGE, FGE and  
FCGT valves  
EM-H-10 current/voltage amplifier

521540  
519700  
519720  
521555  
521556

h - 11  
h - 13  
h - 15  
h - 17  
h - 19

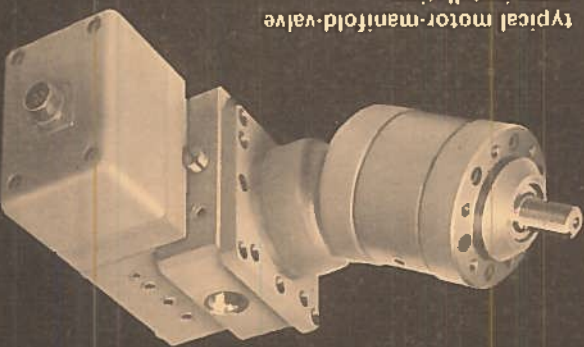
## MODEL CODES

Model codes in this catalog list many options. Some possible model combinations are not readily available. Please contact your Sperry Vickers representative to verify availability.



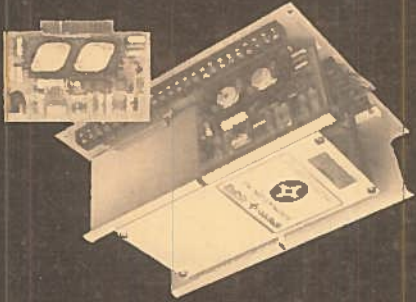
## ...And Systems

**SERVO MOTORS**—Direct manifold to electro-hydraulic servo valves provides a compact installation while maintaining a minimum amount of oil under compression. Sperry Vickers servo motors offer wide speed ranges, low rotating inertia for quick response, and low friction. High speed and pressure capabilities of these piston type motors assure the utmost reliability as required for servo-controlled machines.



typical motor-manifold-valve  
servo installation

**AMPLIFIERS**—Sperry Vickers compact servo amplifier panels control electro-hydraulic servo valves in closed-loop industrial systems. Solid-state power supply has fused input and filtered output circuits. One to four transistorized, reversible polarity operational amplifiers may be used. Integrating and linear types are available, and both may be used simultaneously in the same panel. Amplifiers have gain, balance, and dither adjustments.



servo panel with plug-in amplifiers



# SERVO COMPONENTS & SYSTEMS

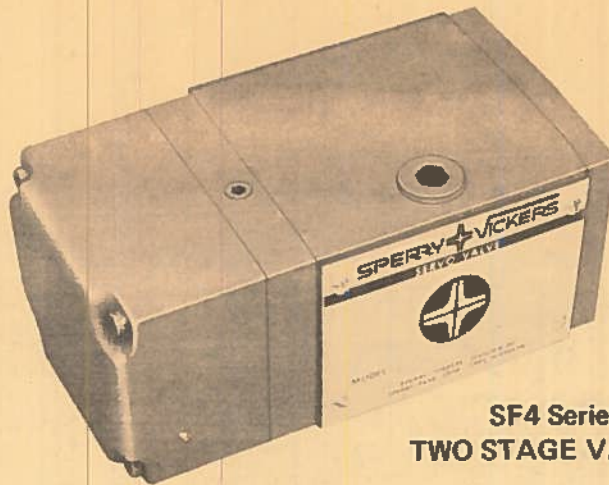
Programmed control of material handling and operation sequencing in processing lines, precise control of velocity and positioning of slides and tables on machine tools, precise tension control of paper and textile machinery are some of the application examples of servo controls.

These and many more applications can be most economically handled by using complete pre-engineered servo-systems based on a "building block" principle. Such systems can include servo-valves, hydraulic activators and power supplies, electronic amplifiers, electrical feed backs, etc.

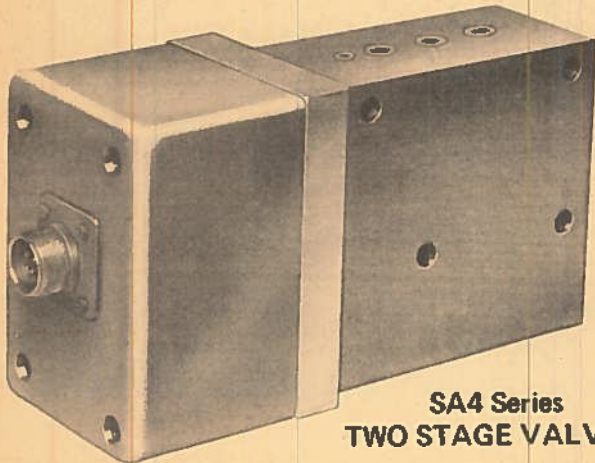
The following pages show our complete line of servo controlled products.



# Servo Components...

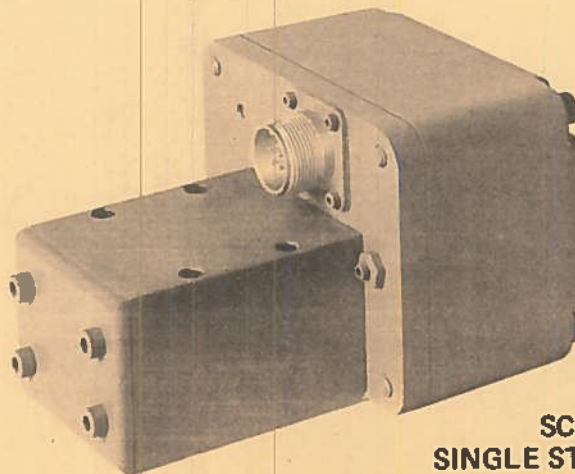


**SF4 Series  
TWO STAGE VALVES**



**SA4 Series  
TWO STAGE VALVES**

Rapid and extremely accurate control of position, velocity and synchronization on industrial, ordnance and marine hydraulic applications is assured with performance-proved Sperry Vickers servo valves. Three basic series—single stage from 0 to 3.5 gpm, and three complete two-stage series from 0 to 37 gpm—enable you to select the one best valve for every application.



**SC4 Series  
SINGLE STAGE VALVES**



# DESCRIPTION

THESE VALVES ARE GENERALLY USED TO CONTROL THE DIRECTION OF FLOW IN A HYDRAULIC CIRCUIT. THIS, IN TURN, WOULD CONTROL THE DIRECTION OF MOVEMENT OF A FLUID CYLINDER, OR THE ROTATION OF A FLUID MOTOR.

## SYSTEM PRESSURE AND FLOW

MAXIMUM OPERATING PRESSURE..... 3000 PSI  
 MAXIMUM TANK LINE PRESSURE..... 3000 PSI  
 MAXIMUM PILOT PRESSURE..... 3000 PSI

SPOOL TYPE	FLOW GPM	MINIMUM PILOT PRESSURE PSI ▲		
		SHIFTING P → A		SHIFTING P → B
		● PRESSURE CENTERED MODELS	● ALL OTHER MODELS	● PRESSURE CENTERED MODELS OTHER MODELS
ALL SPOOLS	0	75	75	75
0, 4, 8 & 9	250	75	★ 75	★ 75
2, 3, 6 & 33	250	150	150	150

▲ SEE FLOW RATINGS BELOW. ALSO DRAIN NOTE UNDER SPRING OFFSET MODELS  
 ON PAGE 517000-1.

● ON PRESSURE CENTERED MODELS END COVERS CANNOT BE INTERCHANGED. PILOT PRESSURE IS NOT AVAILABLE THROUGH USE OF INTEGRAL CHECK VALVE.

★ PILOT PRESSURE 90 PSI FOR SPRING OFFSET MODELS.

## FLOW RATINGS

VALVE TYPE	SPOOL TYPE	RECOMMENDED FLOW CAPACITY	MAXIMUM FLOW WITHOUT MALFUNCTION
NO-SPRING	0, 2, 6 & 9 ●	125 GPM	250 GPM AT 3000 PSI
	0, 4 & 8		
	2, 3, 6 & 33 ■		
SPRING CENTERED	9	85 GPM	85 GPM AT 3000 PSI 125 GPM AT 2000 PSI 150 GPM AT 1000 PSI
	0	125 GPM	250 GPM AT 3000 PSI 200 GPM AT 2000 PSI 200 GPM AT 1000 PSI
SPRING OFFSET	2	125 GPM	250 GPM AT 3000 PSI
	6		
PRESSURE CENTERED	0, 2, 3, 4, 6, 8, 9 & 33 ●	125 GPM	250 GPM AT 3000 PSI

■ AS SYSTEM FLOW INCREASES THE MINIMUM PILOT PRESSURE REQUIRED INCREASES. THESE SPOOLS WILL OPERATE SATISFACTORILY IN EXCESS OF 250 GPM WITH HIGHER PILOT PRESSURES.

PSI PRESSURE DROP CHART — 125 GPM

SPOOL TYPE	FLOW PATH				
	P TO A	B TO T	P TO B	A TO T	CENTERED P TO T
0	45	73	51	65	55
2	55	83	55	76	55
3	55	83	55	48	80
4	80	150	80	170	80
6	55	75	55	46	80
8	62	122	63	138	80
9	46	75	50	70	400
33	55	83	55	76	400

1. FIGURES IN PRESSURE DROP CHART GIVE APPROXIMATE PRESSURE DROPS (ΔP) WHEN PASSING 125 GPM FLOW (Q) OF 100 SUS FLUID(S) HAVING .865 SPECIFIC GRAVITY.

2. FOR ANY OTHER FLOW RATE (Q<sub>1</sub>), THE PRESSURE DROP (ΔP<sub>1</sub>) WILL BE APPROXIMATELY: ΔP<sub>1</sub> = ΔP (Q<sub>1</sub>/Q)<sup>2</sup>

3. FOR ANY OTHER VISCOSITY(S), THE PRESSURE DROP (ΔP) WILL CHANGE AS FOLLOWS:

OTHER VISCOSITY(S)	75	150	200	250	300	350	400
% OF (ΔP) (APPROX.)	93	111	119	126	132	137	141

4. FOR ANY OTHER SPECIFIC GRAVITY (G<sub>1</sub>)†, THE PRESSURE DROP (ΔP<sub>1</sub>) WILL BE APPROXIMATELY: ΔP<sub>1</sub> = ΔP (G<sub>1</sub>/G)

† SPECIFIC GRAVITY OF FLUID MAY BE OBTAINED FROM ITS PRODUCER. THE VALUE IS HIGHER FOR FIRE-RESISTANT FLUIDS THAN FOR OIL.

FILTRATION RECOMMENDED..... 25 MICRON

## MOUNTING

POSITION: NO-SPRING MODELS MUST BE INSTALLED WITH THE LONGITUDINAL AXIS HORIZONTAL FOR GOOD MACHINE RELIABILITY. MOUNTING POSITION OF PRESSURE CENTERED, SPRING OFFSET AND SPRING CENTERED MODELS IS UNRESTRICTED, PROVIDED THAT THE PILOT PRESSURE SUPPLY IS MAINTAINED AS REQUIRED.

NOTE: SURGES OF OIL IN A COMMON PILOT VALVE DRAIN LINE, SERVING THESE AND OTHER VALVES, CAN BE OF SUFFICIENT MAGNITUDE TO CAUSE INADVERTENT SHIFTING OF THESE VALVES. THIS IS PARTICULARLY CRITICAL IN THE NO-SPRING TYPE VALVES. SEPARATE DRAIN LINES OR A VENTED DRAIN MANIFOLD WITH A CONTINUOUS DOWNWARD PATH TO TANK IS NECESSARY.

NOTE: WHEN USED AS OTHER THAN A NORMAL 4-WAY VALVE CONSULT YOUR SPERRY VICKERS REPRESENTATIVE.



**SUBPLATES & BOLT KITS**

VALVES, SUBPLATES AND MOUNTING BOLTS MUST BE ORDERED SEPARATELY.

**EXAMPLES:**

ONE (1) DG3S4-102C-5" VALVE  
ONE (1) DGSM-10-11 SUBPLATE  
ONE (1) BKDG10-636 BOLT KIT

MAXIMUM RECOMMENDED MOUNTING BOLT TORQUE..... 210 LB. FT.  
WHEN SUBPLATE IS NOT USED, A MACHINED PAD (AS INDICATED BY SUBPLATE SHADED AREA) MUST BE PROVIDED FOR MOUNTING; PAD MUST BE FLAT WITHIN .0005 INCH AND SMOOTH WITHIN 63 MICROINCH. MOUNTING BOLTS, WHEN PROVIDED BY CUSTOMER, SHOULD BE SAE GRADE 7, OR BETTER.

**OPTIONAL FEATURES**

**PRESSURE CENTERED VALVES:** THIS OPTION PROVIDES MORE POSITIVE CENTERING THROUGH GREATER FORCE. CENTERING SPRINGS ARE USED, IN ADDITION TO PILOT PRESSURE, TO ENSURE CENTERING (FLOW MUST BE WITHIN THE SPRING CENTERED RATINGS) SHOULD PILOT PRESSURE FAIL. SPRINGS CAN BE REMOVED BY THE USER IF NOT WANTED. CONNECT PRESSURE CENTERED DRAIN PORT DIRECTLY TO THE RESERVOIR THRU A SURGE FREE LINE SO THERE WILL BE NO BACK PRESSURE AT THIS DRAIN.

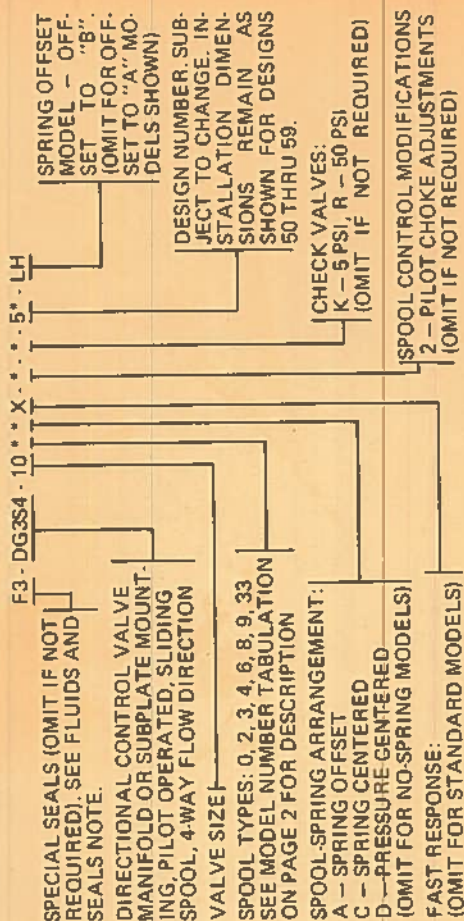
**NOTE:** PRESSURE CENTERED VALVES REQUIRE A PILOT VALVE WHICH DIRECTS PILOT OIL TO CONNECTIONS "X" AND "Y" OF THIS VALVE AT THE SAME TIME PRESSURE CENTERING IS DESIRED.

THE CENTERING TIME DEPENDS ON THE RATE AT WHICH THE PILOT OIL REACHES THE PILOT CHAMBERS.

**FAST RESPONSE:** USE OF THIS OPTION DECREASES SHIFT TIME APPROXIMATELY 60 PERCENT. HOWEVER, SYSTEM SHOCK GENERATION IS CORRESPONDINGLY INCREASED.

**INTEGRAL CHECK VALVES (IN PRESSURE PORT):** FOR PILOT PRESSURE - 50 PSI CRACKING PRESSURE. THIS BACK PRESSURE WILL BE PRESENT AT THE CYLINDER PORTS, IF SPOOL IS "0" TO "9" TYPE. FOR PREVENTING REVERSE FLOW, OTHER THAN LEAKAGE, IN CLAMP CIRCUITS - 5 PSI CRACKING PRESSURE. ORDER ACCORDING TO MODEL CODE.

**FLUIDS AND SEALS:** THE USE OF SYNTHETIC, FIRE-RESISTANT FLUIDS REQUIRES A VALVE WITH SPECIAL SEALS. ADD PREFIX "F3" TO MODEL NUMBER WHEN PHOSPHATE ESTERS OR BLENDS ARE TO BE USED. WATER GLYCOL, WATER-IN-OIL EMULSION AND PETROLEUM OIL FLUIDS MAY BE USED WITH STANDARD SEALS. REFER TO DATA SHEET 1-286-S (SECTION L) FOR HYDRAULIC FLUID AND TEMPERATURE RECOMMENDATIONS.

**MODEL CODE**



**MODEL SERIES DF364-16\*\*-.50  
FLANGE CONNECTIONS**

**EXAMPLE: DF3S4-162C-50 VALVE, ONE (1)**

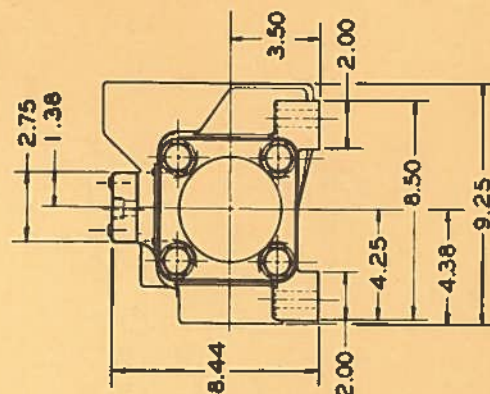
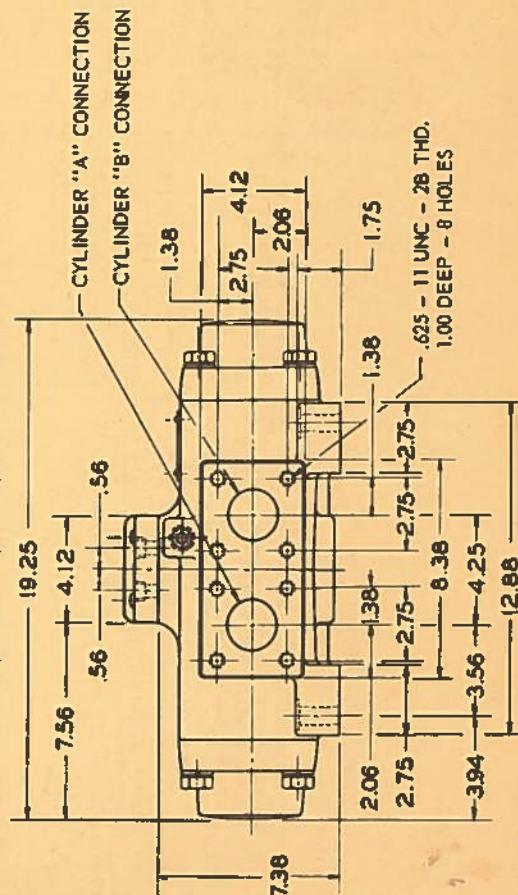
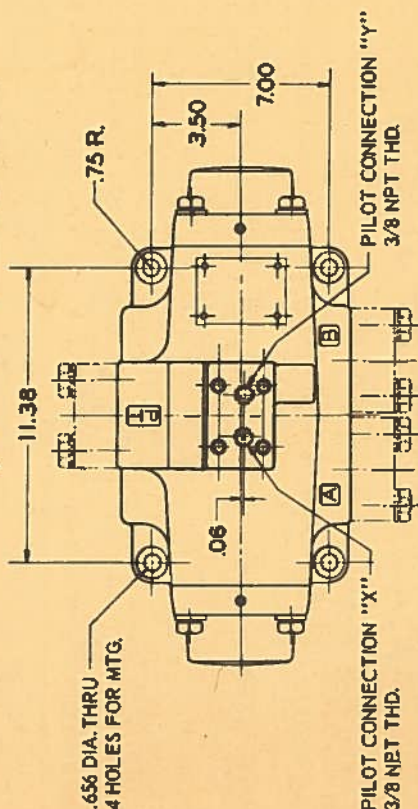
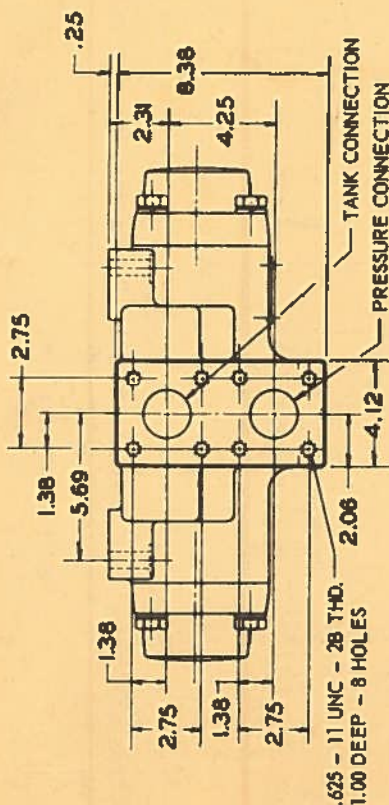
FL-16-PS-20 FLANGE, FOUR (4)

ALL FL-12 (1-1/2 PIPE SIZE) AND FL-16 (2" PIPE SIZE) FLANGES, AND THE FOLLOWING ELL OUTLET 3" PIPE SIZE FLANGES, ARE AVAILABLE.

FL-5-24PL-20 (N.P.T. THD.)  
FL-5-24WL-20 (PIPE WELD)

STRAIGHT AND ELL OUTLET FLANGES ARE FURNISHED WITH A SEAL, SCREWS AND WASHERS FOR FASTENING. SEE DRAWING 522900 FOR 1-1/2" AND 2" FLANGE DIMENSIONS.

**NO SPRING AND SPRING CENTERED MODELS  
WEIGHT (APPROX.) 166 LBS**

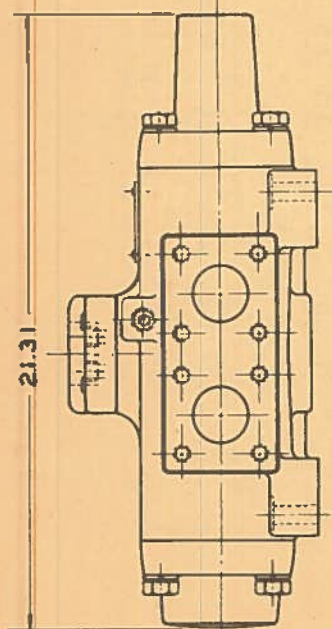


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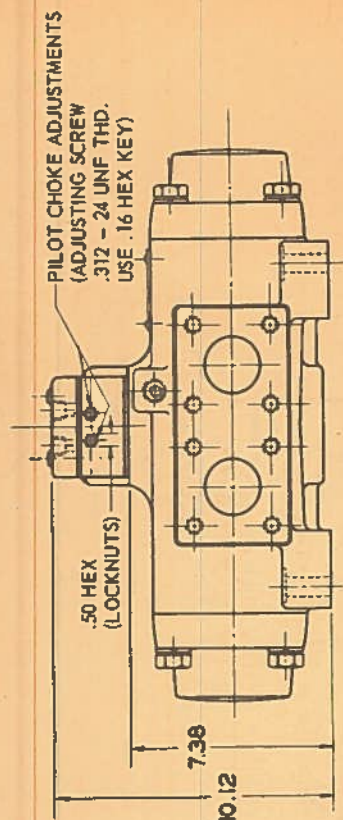
# SPRING OFFSET MODELS



SPRING OFFSET MODEL HAS INTERNAL SPRING WHICH RETURNS SPOOL WHEN PILOT CONNECTION "X" IS OPEN TO TANK. PILOT CONNECTION "Y" BECOMES A DRAIN CONNECTION, WHICH MUST BE CONNECTED DIRECTLY AND INDEPENDENTLY TO TANK.

WEIGHT (APPROX.) 172 LBS.

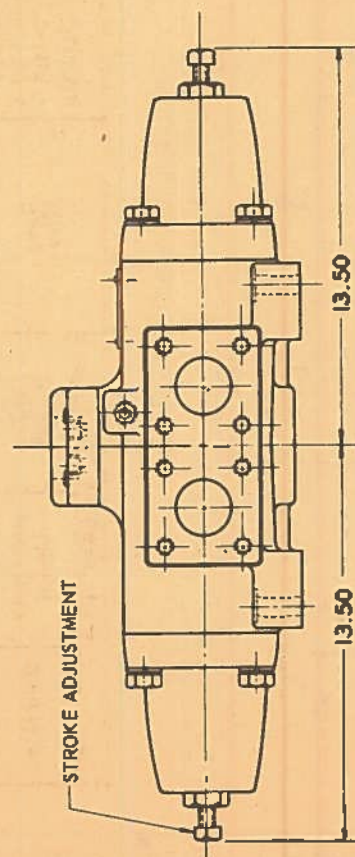
# MODELS WITH PILOT CHOKE ADJUSTMENTS



PILOT CHOKE ADJUSTED BY BACKING OFF LOCKNUTS AND TURNING ADJUSTING SCREWS OUT TO SLOW DOWN RATE OF SPOOL TRAVEL AND IN TO INCREASE THIS RATE. PILOT OIL FOR MODELS WITH THIS FEATURE SHOULD BE TAKEN FROM A SOURCE HAVING CONSTANT PRESSURE.

WEIGHT (APPROX.) 172 LBS.

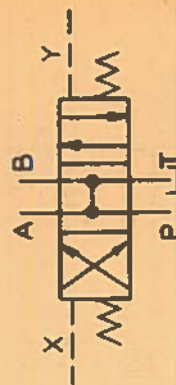
# MODELS WITH STROKE ADJUSTMENTS



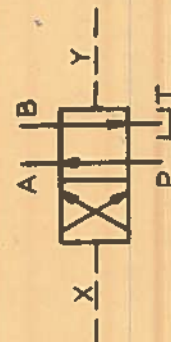
STROKE ADJUSTMENTS LIMIT MOVEMENT OF SPOOL. (BACKING OFF JAM NUT AND TURNING ADJUSTING SCREW IN SHORTENS SPOOL STROKE.)

WEIGHT (APPROX.) 176 LBS.

# TYPICAL GRAPHICAL SLIDING SPOOL SYMBOLS



SPRING CENTERED



NO SPRING



SPRING OFFSET

517100-1



MODEL NUMBERS			SPOOL TYPE	DIRECTION OF OIL FLOW FOR VALVE SPOOL POSITIONS		
NO-SPRING	SPRING CENTERED	SPRING OFFSET		CENTER - APPLIES TO: 1. SPRING CENTERED MODELS AT CENTER 2. NO-SPRING OR SPRING OFFSET MODELS AT CROSSOVER	PILOT PR. CONN. "X" OR SPRING OFFSET	PILOT PR. CONN. "Y" TANK
DF354-160-50	DF354-160C-50	DF354-160A-50	"0" OPEN CENTER ALL PORTS	PR, CYL. A & CYL. B TANK	PR. → CYL. A → TANK	PR. → CYL. B → TANK
DF354-162-50	DF354-162C-50	DF354-162A-50	"2" CLOSED CENTER ALL PORTS	PR, CYL. A & CYL. B BLOCKED	PR. → CYL. A → TANK	PR. → CYL. B → TANK
	DF354-163C-50		"3" CLOSED CENTER P AND B	PR. & CYL. B BLOCKED CYL. A → TANK	PR. → CYL. A → TANK	PR. → CYL. B → TANK
	DF354-164C-50		"4" TANDEM CLOSED CROSSOVER	PR. → TANK CYL. A & CYL. B BLOCKED	PR. → CYL. B → TANK	PR. → CYL. A → TANK
DF354-166-50	DF354-166C-50	DF354-166A-50	"6" CLOSED CENTER P ONLY	PR. BLOCKED CYL. A & CYL. B → TANK	PR. → CYL. A → TANK	PR. → CYL. B → TANK
	DF354-168C-50		"8" TANDEM OPEN CROSSOVER	PR. → TANK CYL. A & CYL. B BLOCKED	PR. → CYL. B → TANK	PR. → CYL. A → TANK
DF354-169-50	DF354-169C-50	DF354-169A-50	"9" OPEN CENTER PARTIAL-ALL PORTS	PR, CYL. A & CYL. B → TANK	PR. → CYL. A → TANK	PR. → CYL. B → TANK
	DF354-163C-50		"33" CLOSED CENTER BLEED A & B	PR. BLOCKED CYL. A & CYL. B → TANK	PR. → CYL. A → TANK	PR. → CYL. B → TANK

→ FULL FLOW  
X RESTRICTED FLOW



## DESCRIPTION

THESE VALVES ARE GENERALLY USED TO CONTROL THE DIRECTION OF FLOW IN A HYDRAULIC CIRCUIT. THIS, IN TURN, WOULD CONTROL THE DIRECTION OF MOVEMENT OF A WORK CYLINDER, OR THE ROTATION OF A FLUID MOTOR.

## SYSTEM PRESSURE AND FLOW

MAXIMUM OPERATING PRESSURE (SEE BELOW) ..... 3000 PSI  
 MAXIMUM TANK LINE PRESSURE ..... 3000 PSI  
 PILOT PRESSURE ..... MINIMUM 85 PSI ..... MAXIMUM 3000 PSI  
 RECOMMENDED FLOW AT 3000 PSI ..... 200 GPM

## MAXIMUM FLOW AND PRESSURE WITHOUT MALFUNCTION

NO SPRING MODELS ..... 350 GPM @ 3000 PSI  
 SPRING CENTERED MODELS - TYPE 9 SPOOL ..... 350 GPM @ 2000 PSI  
 - ALL OTHER SPOOLS ..... 350 GPM @ 3000 PSI  
 SPRING OFFSET MODELS ..... 350 GPM @ 1000 PSI  
 - TYPE 2 & 9 SPOOL ..... 350 GPM @ 3000 PSI  
 - TYPE 0 SPOOL ..... 350 GPM @ 2000 PSI  
 - TYPE 6 SPOOL ..... 350 GPM @ 2000 PSI

PSI PRESSURE DROP CHART

SPOOL TYPE	FLOW PATH					
	P TO A	B TO T	P TO B	A TO T	CENTERED P TO T	
0	11	22	11	24	24	
2	16	41	16	42	52	
3	18	43	16	23	66	
4	23	59	75	33	61	
6	16	20	16	23		
8	23	57	75	33		
9	13	26	13	29		
33	16	41	16	42		

1. FIGURES IN THE PRESSURE DROP CHART GIVE APPROXIMATE PRESSURE DROPS ( $\Delta P$ ) WHEN PASSING 200 GPM FLOW (Q) OF 100 SSU FLUID(S) HAVING .865 SPECIFIC GRAVITY.

2. FOR ANY OTHER FLOW RATE ( $Q_1$ ), THE PRESSURE DROP ( $\Delta P_1$ ) WILL BE APPROXIMATELY:

$$\Delta P_1 = \Delta P (Q_1 / Q)^2$$

3. FOR ANY OTHER VISCOSITY(S), THE PRESSURE DROP ( $\Delta P$ ) WILL CHANGE AS FOLLOWS:

OTHER VISCOSITY(S)	75	150	200	250	300	350	400
% OF ( $\Delta P$ ) (APPROX.)	93	111	119	126	132	137	141

4. FOR ANY OTHER SPECIFIC GRAVITY ( $G_1$ ), \*THE PRESSURE DROP ( $\Delta P_1$ ) WILL BE APPROXIMATELY:

$$\Delta P_1 = \Delta P (G_1 / G)$$

\*SPECIFIC GRAVITY OF FLUID MAY BE OBTAINED FROM ITS PRODUCER. THE VALUE IS HIGHER FOR FIRE-RESISTANT FLUIDS THAN FOR OIL.

FILTRATION RECOMMENDED ..... 25 MICRON

## MOUNTING POSITION

NO-SPRING MODELS MUST BE INSTALLED WITH THE LONGITUDINAL AXIS HORIZONTAL FOR GOOD MACHINE RELIABILITY. MOUNTING POSITION OF SPRING OFFSET AND SPRING CENTERED MODELS IS UNRESTRICTED PROVIDED THAT THE PILOT PRESSURE SUPPLY IS MAINTAINED AS REQUIRED.

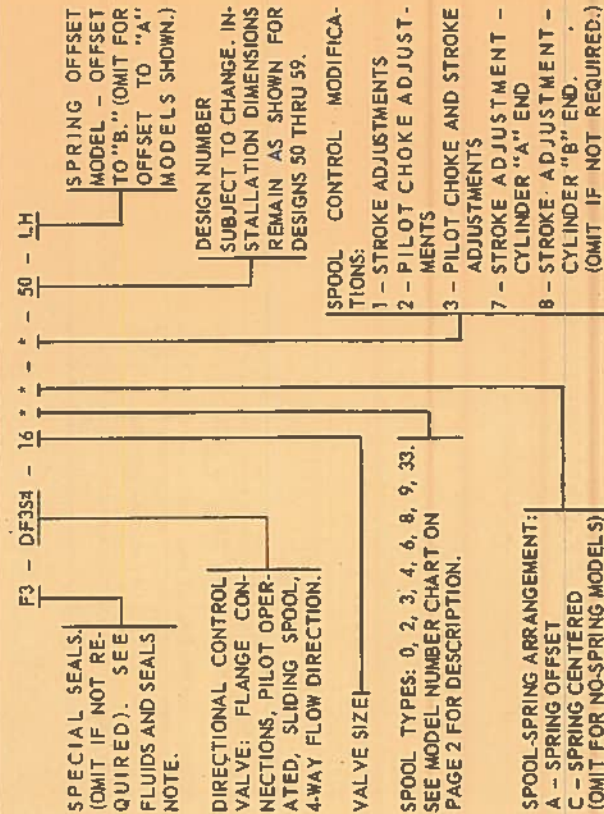
NOTE: SURGES OF OIL IN A COMMON PILOT VALVE DRAIN LINE, SERVING THESE AND OTHER VALVES, CAN BE OF SUFFICIENT MAGNITUDE TO CAUSE INADEQUATE SHIFTING OF THESE VALVES. THIS IS PARTICULARLY CRITICAL IN THE NO-SPRING TYPE VALVES. SEPARATE DRAIN LINES OR A VENTED DRAIN MANIFOLD WITH A CONTINUOUS DOWNWARD PATH TO TANK IS NECESSARY.

WHEN THESE UNITS ARE USED AS OTHER THAN NORMAL 4WAY VALVES, CONSULT YOUR VICKERS REPRESENTATIVE.

## OPTIONAL FEATURES

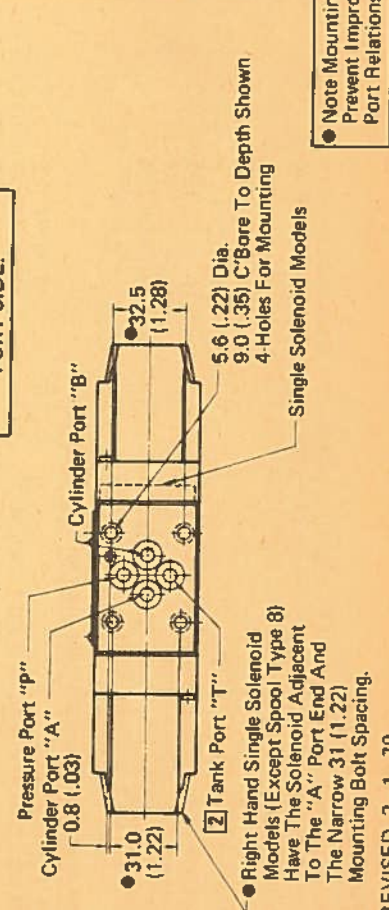
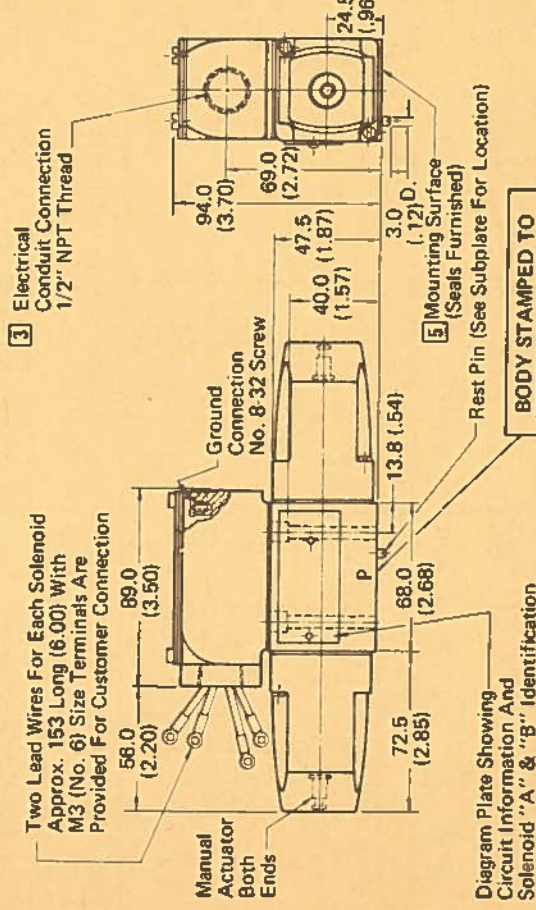
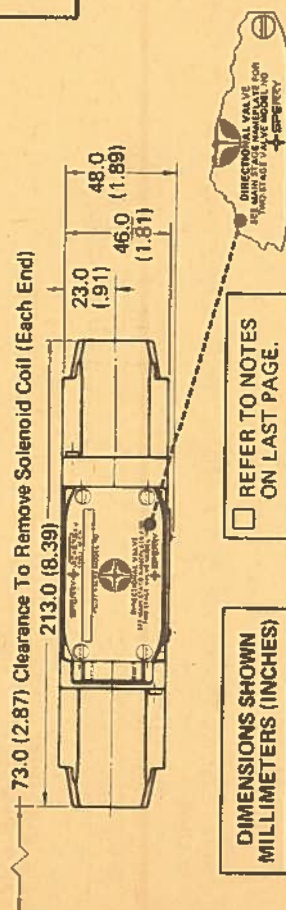
FLUIDS AND SEALS: THE USE OF SYNTHETIC, FIRE-RESISTANT FLUIDS REQUIRES A VALVE WITH SPECIAL SEALS--ADD PREFIX "F3" TO MODEL-NUMBER WHEN PHOSPHATE ESTERS OR CHLORINATED HYDROCARBONS ARE TO BE USED. WATER GLYCOL, WATER-IN-OIL EMULSIONS, AND PETROLEUM OIL FLUIDS MAY BE USED WITH STANDARD SEALS. REFER TO DATA SHEET 1-286-S (SECTION L) FOR HYDRAULIC OIL RECOMMENDATIONS.

## MODEL CODE





**1 DOUBLE SOLENOID MODELS, SPRING CENTERED & NO-SPRING DETENTED MODELS  
DG4V-3-C-\*.1\* AND DG4V-3-2N-\*.1\***



**MODEL SERIES DG4V-3-\*.1\*  
MANIFOLD OR SUBPLATE MOUNTING  
FOR ISO (PROPOSED) SIZE 3 AND NFPA-D01 INTERFACE**

**General Data**

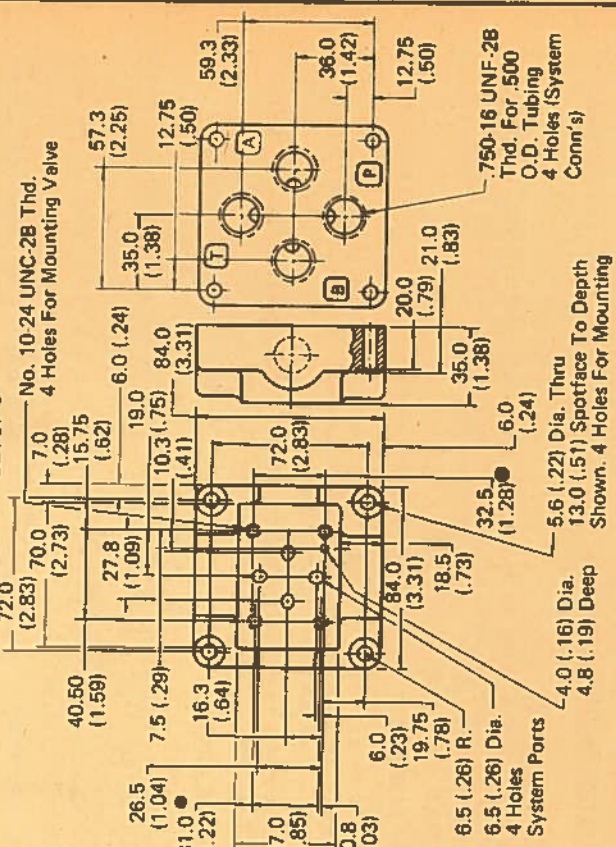
The primary function of these four-way directional valves in a hydraulic circuit is to direct fluid flow. This, in turn, would determine the direction of movement of a fluid cylinder, or the direction of rotation of a fluid motor. These valves have wet armature type solenoids. Port connections are made by mounting the valve on a subplate or manifold.

The electrical connections to the valve are made in the electrical wiring housing. A ground terminal is provided as shown at left.

**Performance:**

Rated Flow Capacity..... 19 liter/min. (5 U.S. GPM)  
Maximum Flow..... 38 liter/min. (10 U.S. GPM)  
Maximum Operating Pressure..... 350 bar (5000 PSI)  
Maximum Tank Line Operating Pressure (See 2)..... 105 bar (1500 PSI)  
See flow and pressure rating chart, page 517350-1.

**5 MOUNTING SUBPLATE  
MODEL DGVM-3-10-S  
CETOP-3**



Note Mounting Bolt Spacing To Prevent Improper Mounting And Port Relationship

A side port subplate (DGMS-3-1E-10-S) is also available. It is the same size and has the same size ports as the one shown above. Request installation print 531280.



# Flow Ratings

Valve Type	Spool Type	Flow Ratings Life /Min. (U.S. GPM)	
		Recommended Flow Capacity	Maximum Flow U.S. GPM
Spring Centered	0, 2, 6, 8	19 liters/min. (5 U.S. GPM)	38
Spring Centered	3, 7, 33		30
Spring Offset (4-Way)	2		30
Spring Offset (2-Way)	22		38
No-Spring Detented	2 & 6		10

■ Spool 8C • S288 19 liters/min. (5 U.S. GPM) and 210 bar (3000 PSI) maximums.

● For ratings, please contact your local Sperry Vickers representative.

## Pressure Drop Chart bar (PSI)

Spool Type	Center Position Models B or C	Description	Flow Path				
			P to A or B	B to T	P to B	A to T	Center Condition
0		Open Center - All Ports	1.8 (26)	1.8 (26)	1.8 (26)	1.8 (26)	P to T 2.0 (28)
2		Closed Center - All Ports	2.1 (31)	2.1 (31)	2.1 (31)	2.1 (31)	
3		Closed Center - P & B	2.1 (31)	2.1 (31)	2.1 (31)	1.4 (20)	A to T 3.0 (44)
6		Closed Center - P Only	3.1 (45)	1.4 (20)	3.1 (45)	1.4 (20)	A or B to T 3.2 (46)
7		Open Center - Tank Blocked	1.8 (26)	2.0 (29)	1.8 (26)	2.0 (29)	A or B to P 2.5 (36)
8C S288		Tandem Open Crossover	1.6 (23)	2.7 (39)	1.6 (23)	2.2 (32)	8.3 (120)
33		Closed Center - Bleed A & B	2.1 (31)	2.0 (29)	2.1 (31)	2.0 (29)	
2A/2N 6N	N.A.	Closed Center - Crossover	2.0 (29)	2.0 (29)	2.0 (29)	2.0 (29)	2.0 (29)

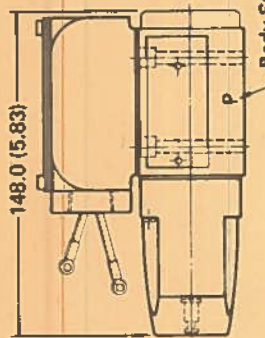
● Except 22A ■ 6N closed center P only crossover

1. Figures in pressure drop chart give approximate pressure drops ( $\Delta P$ ) when passing 19 liter (5 GPM) flow (Q) of 21 cSt (100 SUS) fluid(s) having .87 specific gravity.

2. For any other flow rate ( $Q_1$ ), the pressure drop ( $\Delta P_1$ ) will be approximately:  $\Delta P_1 = \Delta P (Q_1/Q)^2$

# 1 SINGLE SOLENOID MODELS

DG4V-3-2A...1° SPRING OFFSET - DG4V-3-B...1° SPRING CENTERED



Spring Offset Models - When solenoid is de-energized the spool is returned to the spring offset position.

Spring Centered Models - When solenoid is de-energized the spool is returned to the spring centered position.

Right hand assembly shown.

Body Stamped To Identify Pressure Port Side.

3. For any other viscosity ( $\nu$ ), cSt (SUS) the pressure drop ( $\Delta P$ ) will change as follows:

Other Viscosity ( $\nu$ ) % of $\Delta P$ (Approx.)	14 (75)	32 (150)	43 (200)	54 (250)	65 (300)	76 (350)	86 (400)
	93	111	119	128	132	137	141

4. For any other specific gravity ( $G_1$ ), the pressure drop ( $\Delta P_1$ ) will be approximately:

$$\Delta P_1 = \Delta P (G_1/G)$$

Specific gravity of fluid may be obtained from its producer. The value is higher for fire-resistant fluids than for oil.

Solenoids are identified by a letter in the model number.

Example: DG4V-3-2C-W-B-10

Solenoid Voltage Rating	Identification Letter	Inrush amps (R.M.S.)	Holding amps	Holding watts
115/120 V ac 60 Hz	B	2.0	.4	26
110 V ac 50 Hz				
230 V ac 60 Hz	D	1.0	.2	26
220/230 V ac 50 Hz	F	-	4.5	27
6 V dc	G	-	2.2	26
12 V dc				
24 V dc	H	-	1.1	26

● Maximum peak inrush amps approximately 1.4 x R.M.S. value shown.

## TYPICAL GRAPHICAL SYMBOLS

SPRING OFFSET	SPRING CENTERED DOUBLE SOLENOID	NO-SPRING DETENTED	SPRING CENTERED SINGLE SOLENOID
TYPE 2 SPOOL (4-WAY) (AVAILABLE)			
TYPE 22 SPOOL (2-WAY) (AVAILABLE)			
ALL SPOOL TYPES (AVAILABLE)	ALL SPOOL TYPES (AVAILABLE)	TYPE 2 & 6 SPOOLS (AVAILABLE)	ALL SPOOL TYPES (AVAILABLE)

Note: On all models shown when solenoid "A" is energized, flow is always P → A. When solenoid "B" is energized, flow is always P → B. Solenoid "A" & "B" are identified on the diagram plate on the side of the valve.

517350-1



**1 Solenoid Energizing** — Spring centered and spring offset types will be spring positioned unless solenoid is energized continuously. No-spring detented valves may be energized momentarily, approximately 0.1 second; when solenoid is de-energized spool will remain in last position attained provided there is no severe shock, vibration, or unusual pressure transients.

**2 Note:** The tank return must be designed so that transient tank line pressure peaks do not exceed 170 bar (2500 PSI). (Except 22A two-way, on which "T" is a drain and must be connected to tank thru a surge free line so there will be no back pressure at this port and the drain line must incorporate a loop approximately (within .5 inches) level with the highest horizontal body dimension. This loop is required to provide a positive head of oil on the valve to insure a full tank chamber.)

Surges of oil in a common tank line serving these and other valves can be of sufficient magnitude to cause inadvertent shifting of these valves. This is particularly critical in the no-spring detented type valves. Separate tank lines or a vented manifold with a continuous downward path to tank is necessary.

### 3 Electrical Connection

Note: 1/2 NPT thread for DG4V-3-\*-\*W-\*-\*1\* models. For alternate electrical connection see your application engineer. (Electrical conduit connection can be rotated 180° from position shown by removing 2 screws located inside the wiring cavity.)

The conduit connection readily adapts to connector-receptacle assemblies on the market.

**4 Note:** Any sliding spool valve, if held shifted under pressure for long periods of time, may stick and not spring return due to fluid residue formation and, therefore, should be cycled periodically to prevent this from happening.

When used as other than a normal 4-way valve or other than is shown on page 517350-1, consult your local Sperry Vickers representative.

### 5 Mounting Face Information

Mounting face must be flat within 0.013 mm (.0005) and smooth within 1.1 micrometer (45 microinch). Mounting bolts when provided by customer, should be SAE grade 7, or better.

**Mounting Bolt Kits** ..... U.S. .... BKDG3-698  
**Bolt Torque.** ..... Metric ..... 4.5 to 6.0 Nm (40 to 53 lb. (f) in.)

### Adapter Plates

The DG4V may be mounted in place of the D1L-\*10 series through the use of mounting adapter plate MODAM-10. The overall installation height will increase by 19.1 (.75). Bolts and "O" rings are included with the adapter plate.

The DG4V can be mounted in place of the DG4S4-01-\*50 series through the use of mounting adapter plate DGAM-3-01-10, shown on drawing 517360. The overall installation height will increase by approximately 38 mm (1.5 inches) on models without lights. Bolts and seals are furnished for mounting the adapter plate. (With "A" models, solenoid location is reversed.)

### Solenoid Indicator Lights

Light is "on" when there is current at the coil. Lights are available for "B" & "D" solenoids.



### Indicator Lights

Add 7 (.28) to valve height.

### Mounting Position

Good hydraulic design practice suggests that detented models be mounted with longitudinal axis horizontal. Other models may be mounted in any position.

Note: Two-way offset valves must be mounted with the solenoid on the bottom when the valves are installed with the longitudinal axis vertical.

### Typical Spool Shift Time For Spring Offset and Spring Centered Models (Rated Flow and Pressure)

Solenoid Energized	
AC	12 M Sec.
DC	30 M Sec.
Spring Return	
AC	22 M Sec.
(All spools except 2 and 6)	
DC	45 M Sec.
(Including AC type 2 and 6 spools)	
Offset to Offset on Spring Centered Models	
AC	25 M Sec.
DC	50 M Sec.
Maximum Cycling Rate	
(All spool positions actuated once/cycle)	
4 Hz ac	3 Hz dc

### Filtration

To insure sustained efficiency and maximum trouble free life, initial and continuous filtration of the system fluid to 35 micron absolute, or less is essential.

### Fluids and Seals

Viton seals are standard and suitable for use with phosphate ester type fluids or its blends, water glycol, water-in-oil emulsion fluids and petroleum oil. Refer to data sheet 1-286-S for hydraulic fluid and temperature recommendations.

### Weight (Approx.)

DG4V-3-*C/N-W-*-*1*	Double Solenoid Models	kg	2.1	Lbs.	4.6
DG4V-3-*A/B-W-*-*1*	Single Solenoid Models	kg	1.7	Lbs.	3.7

### Model Code

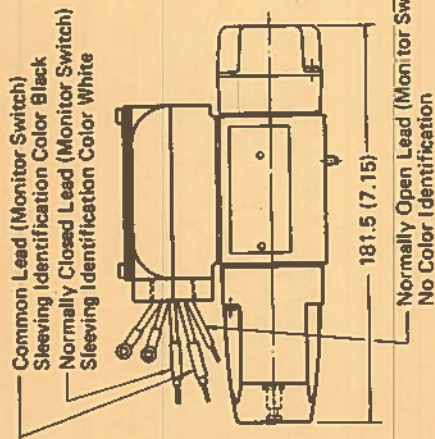
Insta-Plug	PB · S D G 4 V · 3 · * · * · * · * · 10 · (LH)	Single Sol. Models For Left Hand Assembly. Omit For Right Hand Assembly (Shown).
Monitor Switch		Design Number
Directional Control Valve		Subject to Change. Installation Dimensions Remain As Shown For Design Numbers 10 Thru 19.
Mounting Type		Coil Identification Letter:
Manifold or Subplate		"B" — (115/120/80, 110/50) For Other Voltages See Chart.
Solenoid Operated		
Rated Pressure	350 bar, 5000 PSI	
Interface NFPA-DO1		

### Type of Spool (See Tabulation Page 1)

Electrical Options	
W	— 1/2 NPT Thread — Wiring Housing
WL	— 1/2 NPT Thread — Wiring Housing With Solenoid Indicator Lights. (B & D Solenoids Only)
Spool Direction	
"A"	— Spring Offset
"B"	— Spring Centered — Single Solenoid
"C"	— Spring Centered — Double Solenoid
"N"	— No Spring Detented (Monitor Switch is Available With Spool Spring Arrangement "A" And "B" Only)



# **INTEGRAL MONITOR SWITCH** **MODEL SDG4V-3-\*\*\*-10** (See Model Code)



**Integral Monitor Switch** permits electrical monitoring of valve spool position and may be wired into control circuit to indicate valve function. For current load vs. life expectancy for this MICRO-SWITCH no. 41S1-T, contact manufacturer.

## **Monitor Switch Data**

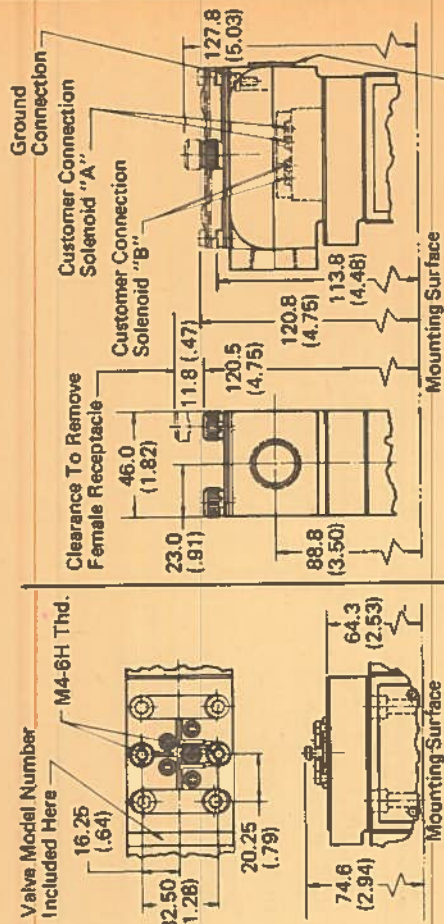
**MICRO-SWITCH** Underwriters Laboratories Inc. listed number L 190, 11 amps @ 125/250 Vac; 5 amps @ 30 Vdc. Single pole, double throw.

## **Note: Valve Rating**

The tank pressure should not exceed 200 PSI and the valve malfunction flow is 8 U.S. GPM.

Monitor switch housing does not provide for manual operation.

# **INSTA-PLUG FEATURE**



Warning Plate  
 Electrical Power Must Be  
 Disconnected Before Removing  
 or Replacing This Receptacle

PBDG4V-3-\*\*\*-10(S-300)

## **Insta-Plug Description and Features**

Sperry Vickers "Insta-Plug" provides a means of disconnecting electrical power to the valve without actually breaking individual wire connections. The male half of the plug is attached to the top of the valve body. Solenoid leads are connected to this half of the plug by Sperry Vickers. The mating plug is attached inside the wiring housing. Terminals are provided on top of it for the convenience of connecting machine wires.

Two thumb screws are used to hold the wiring housing with the female plug half to the valve. These screws are captive to avoid loss on servicing. To disconnect the valve they are loosened until clear, allowing the wiring housing to be pulled away from the valve body; thereby disconnecting electrical power to the valve. Note that the ground or fifth post is longer than the other four, providing a first-make/last-break ground feature.

PBDG4V-3: The PB configuration includes both the male and female (retained in the wiring housing) halves for a complete plug-in unit.

Solenoid indicator lights can also be furnished with the Insta-Plug feature. When furnished, Sperry Vickers provides wiring to the lights from the terminals on the female half of the plug. Solenoids "A" and/or "B" are identified on the diagram plate attached to the side of the valve.



**SPERRY VICKERS**  
TROY, MICHIGAN 48064

**DG4V MODULES, MANIFOLDS,  
CROSSOVER PLATES,  
BLANKING PLATES,  
SUBPLATES**

**RELIEF, REDUCING,  
SEQUENCE, FLOW CONTROL,  
CHECK AND PILOT  
OPERATED CHECK VALVES**

**RATED 19 L/min  
5 (U.S.) GPM  
MAXIMUM 38 L/min  
10 (U.S.) GPM**

**MANIFOLD  
OR  
SUBPLATE  
MOUNTING**

**DWG. NO.  
517355**

### General Data All Modules

These stackable modules are designed for use with miniature directional valves having an NFPA-D01 interface (CETOP-3 European) such as Sperry Vickers DG4V-3. All circuit flow paths are contained within the control valve and modules, thereby creating a pipeless, simplified, space saving system. Single subplates or multi-station manifolds are available for mounting the modules. Modules available are: relief valve (in-line or cross port), sequence, back pressure, reducing, flow control (single and dual), direct check, and pilot operated check valves. Through use of blanking, crossover, and tapping plates, more elaborate circuitry is possible. See directions for stacking these modules in subplate section, and see Bulletin 78-202.

**Maximum Operating Pressure.** ..... 250 bar (3600 PSI)  
**Maximum Tank Line Operating Pressure.** ..... Pressure Controls 105 bar (1500 PSI)  
**With Transient Peaks Limited to 170 bar (2500 PSI) — All other controls 250 bar (3600 PSI).**

**Flow**  
**Rated.** ..... 19 liters/min. (5 U.S. GPM)  
**Maximum.** ..... 38 liters/min. (10 U.S. GPM)  
See individual module for typical performance curves.

### Filtration

To insure sustained efficiency and maximum trouble free life, initial and continuous filtration of the system fluid to 35 microns absolute, or less, is essential.

### Fluids, Seals, Temperature and Viscosity

Viton® seals are standard and suitable for use with phosphate ester type fluids or its blends, water glycol, water-in-oil emulsion fluids and petroleum oil. Seals are retained in counterbores within the body interface (not in a water plate) for ease in assembly and to eliminate leakage. Refer to data sheet 1-286-S for additional hydraulic fluid and temperature recommendations.

### Mounting Face

If a subplate or multi-station manifold is not used as a mounting base, the base provided must be flat within 0.013 mm (.0005 in.) and smooth within 1.1 micrometer (45 microinch). Mounting bolts when provided by customer, should be SAE grade 7, or better. See subplates page 7.

### Mounting Bolts

Module will accept M5-6g or 10-24 UNC-3A mounting bolts. Nominal thread engagement in mounting subplate to be 10.0 mm (.39 in.). Recommended bolt torque 5.6 Nm (50 lb. in.).

### Mounting Position.

..... Optional

### Adapter Plates

As with the DG4V-3, DG17V-3, and DG2DV-3, these modules mounted on adapter plate DGAM-3-01-10 can interface with the DG4S4-01 mounting (NFPA-D02, CETOP-5). See drawing 517360.

### Weight Per Module

	Kg	Lb.
DGMC	1.4	3.0
DGMC2	1.7	3.7
DGMX1, DGMR1, DGMR	1.2	2.6
DGMFN	1.1	2.5
DGMD	1.0	2.2
DGMP	1.0	2.2
DGMA	0.5	1.0

### General Drain Note:

All valves requiring a drain are internally drained. Any pressure in the line to which they are drained will be additive to the pressure setting of pressure controls and could influence the performance of these and other modules. Refer to catalog drawing 517350 for complete application information on the DG4V directional control used with these modules.

**SPERRY VICKERS**  
T.M.

## HYDRAULIC VALVE MODULES

ISO (Proposed) Size 3 & NFPA-D01

**WITH SINGLE AND MULTI-STATION SUBPLATES FOR USE WITH DG4V-3  
DIRECTIONAL CONTROL TO 38 liters/min. (10 U.S. GPM) 250 bar (3600 PSI)**

### Modular Valve Circuitry Guide

To achieve optimum system performance with modular valves, it is essential that the basic principles of hydraulic circuitry be followed, particularly with respect to the location of individual modules relative to others in the circuit. In considering these relationships we can put the modules into two groups:

#### Group A —

- Valves acting in the pressure and/or tank lines —
- DGMC-3
- DGMR-3
- DGMX1-3
- DGMD-3
- Direct check valve module
- Pressure reducing valve module
- Sequence valve module
- System relief valve module

#### Sample of modular circuit stack

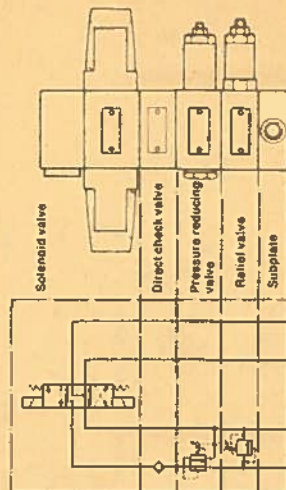


Figure 1

The general rule in this group is that the DGMD-3 direct check valve module be placed nearest the directional control valve. The DGMR or DGMX valve module would be next in order and the furthest valve would be the DGMC system relief valve module. See Figure 1.

#### Group B —

#### Valves acting in the service lines —

- DGMFN-3-X
- DGMFN-3-Y
- DGMC2-3
- DGMPC-3
- Flow regulator valve module (meter-in)
- Flow regulator valve module (meter-out)
- Dual crossline relief valve module
- Dual pilot operated check valve module

#### Sample of modular circuit stack

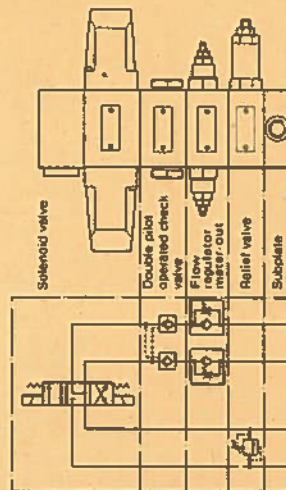


Figure 2

The general rules for group B are as follows:

When using a DGMPC with a DGMFN-3-Y (meter-out), the DGMPC should be nearest the directional valve. Figure 2, but when the DGMPC is used with a DGMFN-3-X (meter-in) the relevant positions are flexible. When the DGMC2 dual crossline relief valve module is used with one or both of the valves in this group its position is critical, dependent on the nature of the application. When it is to be used as a braking or deceleration device its position should be furthest from the directional control valve. Alternatively, when the crossline DGMC2 valve is used as a torque control mechanism its position should be closest to the directional control valve relevant to the other valves in group B.



**SINGLE AND CROSSLINE RELIEF,  
REDUCING BACK PRESSURE  
AND SEQUENCE MODULES**



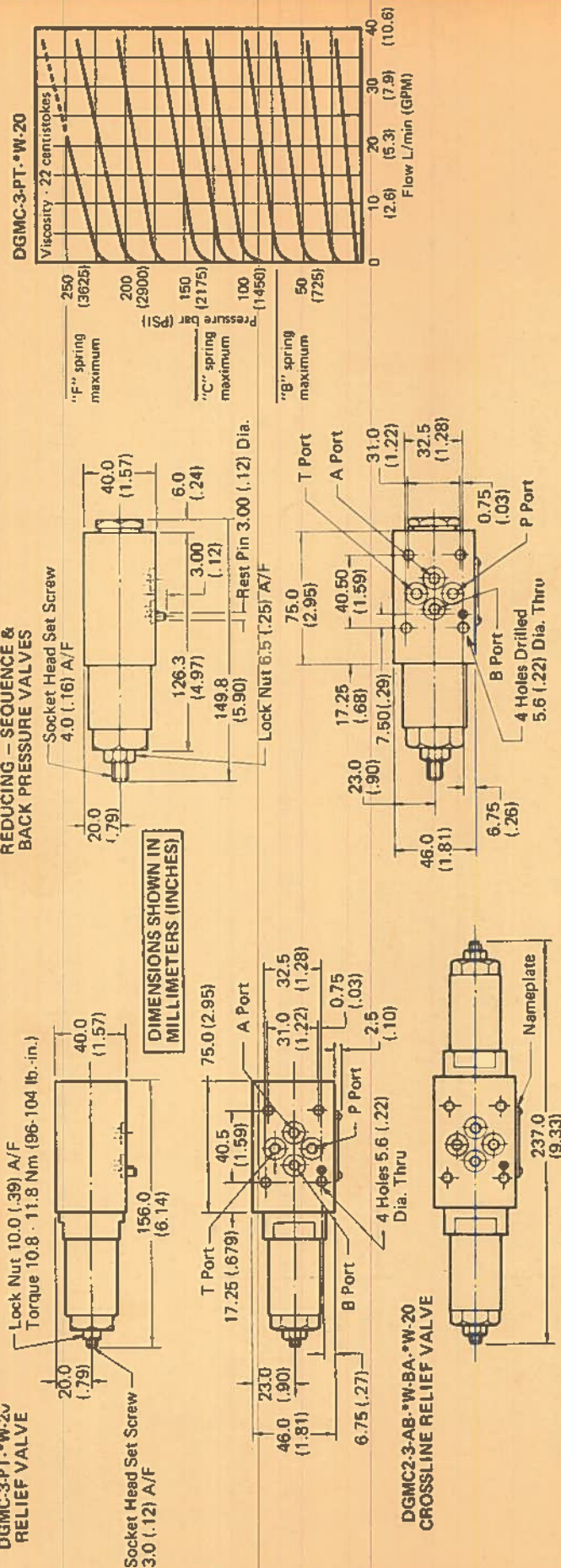
**MODELS DGMC AND DGMC2-20 DESIGN – DGMX1, DGMR, AND DGMR1-20 DESIGN  
MANIFOLD OR SUBPLATE MOUNTING**

## TYPICAL PERFORMANCE CURVES

DGM\*\*-3\*\*-\*W-20  
REDUCING - SEQUENCE &  
BACK PRESSURE VALVES

DGMC-3-PT.\*W.2V  
RELIEF VALVE

DGMC2-3-AB\*W.BA\*W-20  
CROSSLINE RELIEF VALVE



### Performance (See curves at right)

**DGMC Relieves line P and exhausts into line T.**

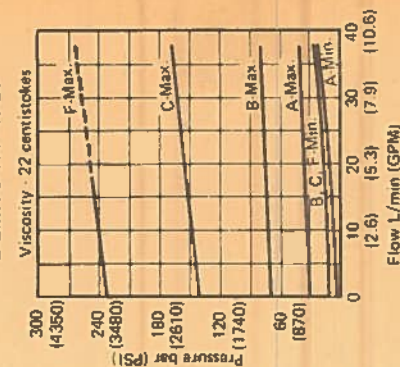
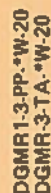
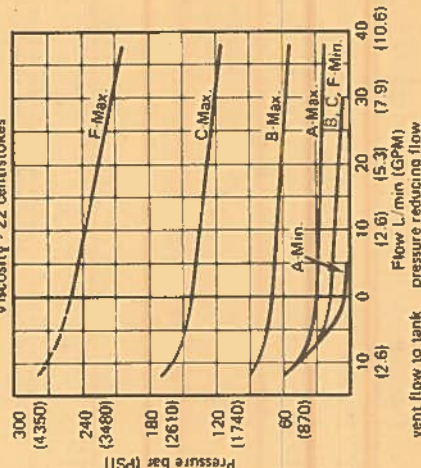
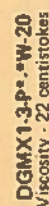
**DGMC2 Alternately relieves lines A or B as one or the other becomes a pressure or tank line.**

DOG MX1 Maintains a constant reduced outlet pressure against a variation of inlet pressure above a set point. The curves (right) show the "A", "B", "C", and "F" pressure range spool vent feature which prevents undesirable pressure rise in a trapped cylinder when the cylinder could be pushed back. They show the degree of pressure override for different flow rates and the pressure change from a reducing to a vent function.

**Note:** As with all pressure reducing valves, attention should be paid to external downstream circuitry when very low reduced pressure levels are required. If back pressure created under dynamic conditions is greater than the reduced pressure setting, the valve will close.

Care should be taken when applying the low rate "A spring" on applications where the minimum pressure setting is required. If you have a bordering case, or are in doubt, check with your Sperry Vickers Application Engineer.

**DGMR\*** The direct acting, normally closed, sequence valve in the pressure line prevents flow to the branch of the circuit until the pressure setting of the valve is reached upstream of the valve. In the normally closed position, the secondary port is vented to tank. The normally closed back pressure valve in the tank line is remotely operated from the "A" line. Four available springs cover the pressure range of 3.5 to 250 bar (50-3600 PSI).



517355-1



# STANDARD GRAPHICAL SYMBOLS FOR FLUID POWER DIAGRAMS

Model No.	Function	Description	P	T	B	A
DGMC-3-PT-W-20	Single Relief Valve	Relieving from P to T				
DGMC2-3-AB-W-BA-W-20	Cross-line Relief Valve	Alternately relieving Ports A to B & B to A				
DGMX1-3-PP-W-20	Reducing Valve	Operated from and reducing in P, vented and drained to T line				
DGMX1-3-PA-W-20	Reducing Valve	Operated from A, reducing in P, vented and drained to T line				
DGMX1-3-PB-W-20	Reducing Valve	Operated from B, reducing in P, vented and drained to T line				
DGMR1-3-PP-W-20	Sequence Valve	Directly operated internally drained. Secondary vented to tank in closed position.				
DGMR-3-TA-W-20	Back Pressure Valve	Operated from A, internally drained.				

Note: These valves drain to the tank line or to the discharge line. Any pressure in the line to which they are drained is additive to the valve pressure setting. See general data section front page of this drawing no. 517355.

When considering the DGMR module for use as a counterbalance valve, care should be taken in its application. Being located in the tank port rather than the A or B actuator ports its operational characteristics differs from an ordinary counterbalance valve. For further assistance, we suggest you contact your Sperry Vickers application engineer.

## Model Code — Sequence and Back Pressure (Counterbalance) Valve Modules

Modular Valve — DGM \*\* - 3 - \*\* - \*W - 20

Valve Type  
R1 = Sequence Valve  
R = Back Pressure Valve (Counterbalance)

Interface  
3 = ISO (Proposed) size 3 & NFPA-D01

Port Operated Upon  
P = R1  
T = R

Pilot Control Port  
P = R1 A = R

Design Number  
Subject to modification, installation dimensions remain as shown for design 20-29.

Method of Adjustment  
W = Standard, hex screw and lock nut

Pressure Range  
A = 3.5-30 bar (50-425 PSI)  
B = 15-70 bar (225-1000 PSI)  
C = 15-140 bar (225-2000 PSI)  
F = 15-250 bar (225-3600 PSI)

## Model Code — Single and Dual Crossline Pressure Relief Valve Modules

Modular Valve — DGM \*\* - 3 - \*\* - \*W - \*\* - \*W - 20

Valve Type  
C = Single Relief Valve  
C2 = Dual Crossline Relief Valve

Interface  
3 = ISO (Proposed) size 3 & NFPA-D01

Port Operated Upon  
P = C (Single) A = C2 (Crossline)

Port Drained To  
T = C (Single) B = C2 (Crossline)

Pressure Range  
DGMC  
B = 7-70 bar (100-1000 PSI)  
C = 3.5-70 bar (50-1000 PSI)  
C = 7-140 bar (100-2000 PSI)  
F = 7-250 bar (100-3600 PSI)

DGMC2  
B = 7-70 bar (100-1000 PSI)  
C = 12-140 bar (175-2000 PSI)  
F = 12-250 bar (175-3600 PSI)

Port Drained To  
A = C2 (Crossline)  
(Omit for C type valves.)

Port Operated Upon  
B = C2 (Crossline)  
(Omit for C type valves.)

Method of Adjustment  
W = Standard, hex screw and lock nut

Design Number  
Subject to modification, installation dimensions remain as shown for design 20-29.

Method of Adjustment  
W = Standard, hex screw and lock nut  
(Omit for C type valves.)

Pressure Range  
B = 7-70 bar (100-1000 PSI)  
C = 12-140 bar (175-2000 PSI)  
F = 12-250 bar (175-3600 PSI)  
(Omit for C type valves.)

## Model Code — Pressure Reducing Valve Modules

Modular Valve — DGM X1 - 3 - \*\* - \*W - 20

Valve Type  
X1 = Pressure Reducing Valve

Interface  
3 = ISO (Proposed) size 3 & NFPA-D01

Port Operated Upon P

Pilot Control Port  
P, A, or B

Design Number  
Subject to modification, installation dimensions remain as shown for design 20-29.

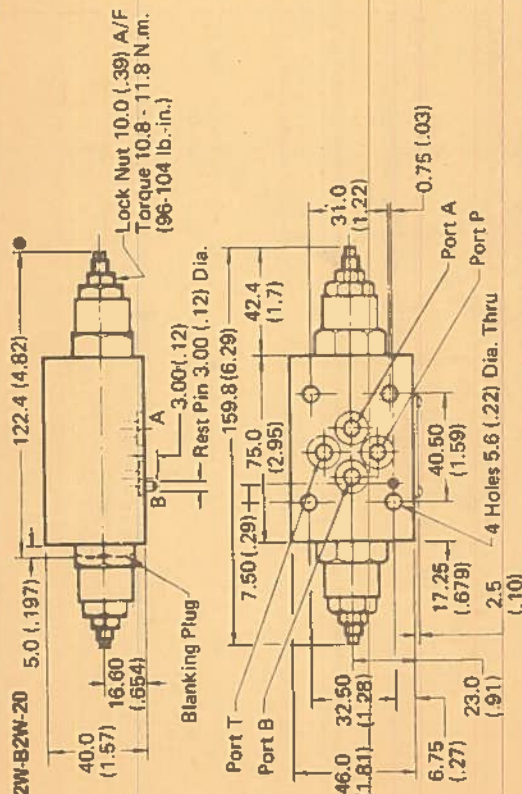
Method of Adjustment  
W = Standard, hex screw and lock nut

Pressure Range  
A = 3.5-30 bar (50-425 PSI)  
B = 15-70 bar (225-1000 PSI)  
C = 15-140 bar (225-2000 PSI)  
F = 15-250 bar (225-3600 PSI)



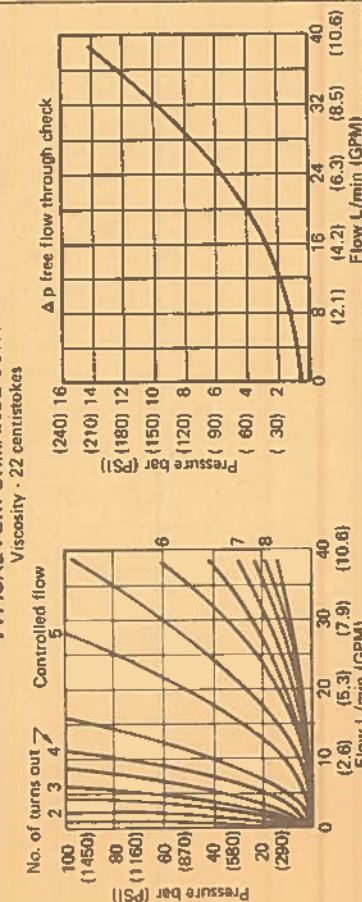
The DGMFN modular valves are flow restrictors that act as non-compensated flow control valves. An integral check valve around each regulating orifice in the A and B service lines (for A only or B only) allows free flow in one direction and metered flow in the other. The valve is available as "X" type meter-in and "Y" type meter-out. The valve setting is adjustable by means of a screwdriver — slotted adjusting screw with securing lock nut. (When used with pilot operated checks, see note on page 5 and circuit and notes on front page.)

### DGMFN-3-X-A2W-B2W-20 METER-IN



● DGMFN 3-X-A2W-20 meter-in port A only. For port B only, reverse blanking plug and flow control parts.

### TYPICAL PERFORMANCE CURVES



### Model Code

DGM FN - 3 - \* - \* 2 W - B 2 W - 20

Modular Valve  
Flow Control Valve  
Interface  
3 = ISO (Proposed) size 3 & NFPA-D01  
Direction of Flow  
X = Meter-in/free flow out  
Y = Meter-out/free flow in  
Port Operated Upon A For Dual (A or B for single)  
Throttle Type  
2 = Standard control

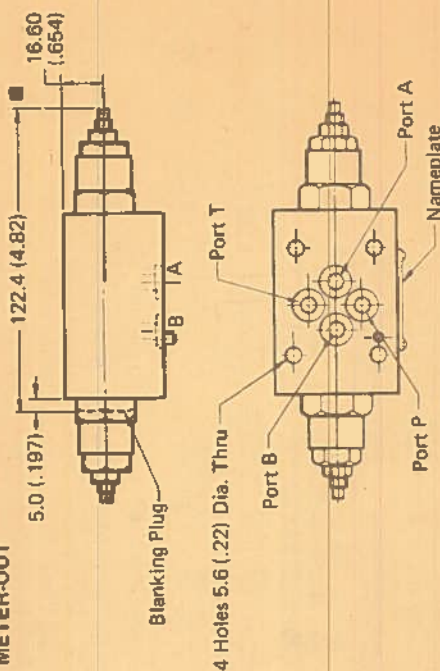
Design Number  
Subject to modification, installation dimensions remain as shown for design 20-29.  
Method of Adjustment  
W = Standard, hex screw and lock nut  
Throttle Type  
2 = Standard control  
Port Operated Upon B (Dual only)  
Method of Adjustment  
W = Standard, hex screw and lock nut

## FLOW CONTROL VALVE MODULES

SPERRY VICKERS  
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### MODEL DGMFN-20 DESIGN MANIFOLD OR SUBPLATE MOUNTING

### DGMFN-3-Y-A2W-B2W-20 METER-OUT



■ DGMFN 3-Y-A2W-20 meter-out port A only. For port B only, reverse blanking plug and flow control parts.

### STANDARD GRAPHICAL SYMBOLS FOR FLUID POWER DIAGRAMS (See front page and page 7 for "in" and "out" orientation.)

#### DGMFN-3-Y-A2W-B2W-20 Dual Meter-out "A" & "B" Ports



#### DGMFN-3-X-A2W-B2W-20 Dual Meter-in "A" & "B" Ports



#### DGMFN-3-Y-B2W-20 Single Meter-out "B" Port



Models DGMFN-3-X-B2W-20 and DGMFN-3-Y-A2W-20 also available.

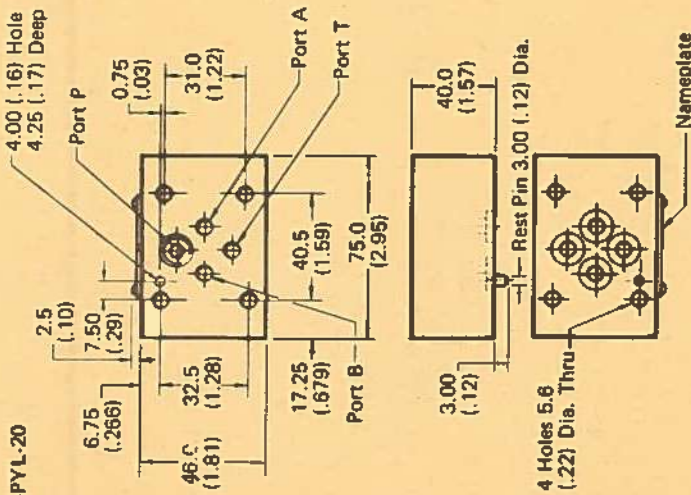
517355-3



# General Data

DGMDC modular direct check valves are self-operated spring loaded poppet type units. The location of the functional element is in the P port and its optimized design ensures unrestricted flow with minimum head loss. Check valve cracking pressure (opening pressure) is 0.35 bar (5 PSI).

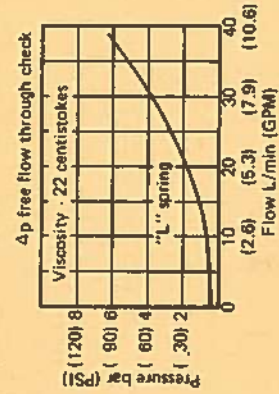
## DGMDC-3-PYL-20



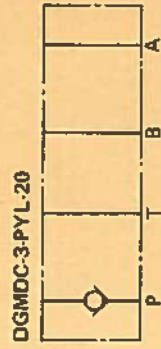
# DIRECT CHECK VALVE MODULES

## MODEL DGMDC-20 DESIGN MANIFOLD OR SUBPLATE MOUNTING

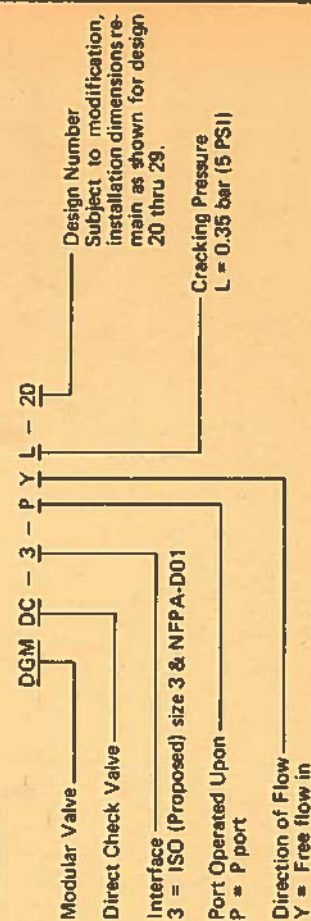
### TYPICAL PERFORMANCE CURVES



### STANDARD GRAPHICAL SYMBOL FOR FLUID POWER DIAGRAMS



### Model Code

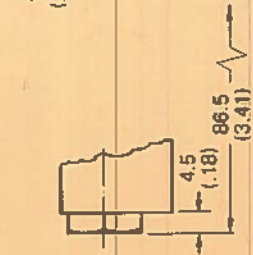




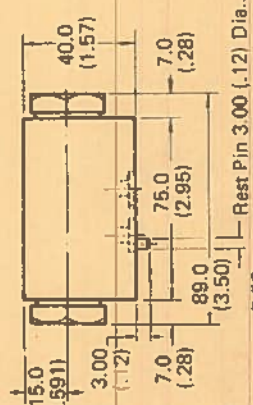
# General Data

DGMPC modular pilot operated check valves are designed as self-operated seating units. They have twin check elements located in the primary lines A and B. The check valve poppets are moved into the open position by a central pilot control spool which moves towards one check or the other depending on which port is pressurized. The pilot spool area to valve seat ratio is 4:1. The check valve located in the return circuit is opened by the operating pressure in the primary circuit. When the pressures in both pilot lines are vented then both valves will remain closed. These units are suitable for maintaining cylinders in a stationary position. Single pilot operated check modules which check either the "A" or "B" port are also available. Check valve cracking pressure (opening pressure) is 1 bar (15 PSI).

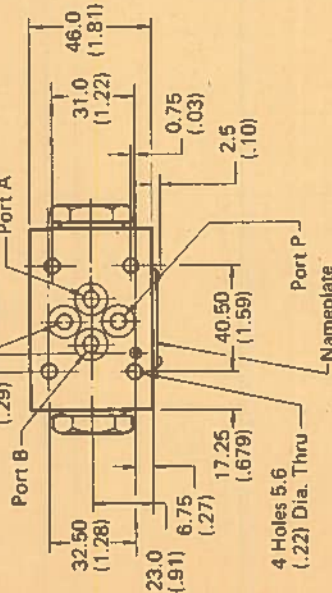
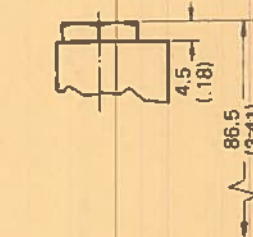
DGMPC-3-ABK-20



DGMPC-3-ABK-BAK-20



DGMPC-3-BAK-20



Note: When applying pilot operated check valve modules, it is desirable to include a flow control "DGMFN" module to impose a greater back pressure on the cylinder than the load generates to avoid chattering. The circuit and notes are shown on the front page of this drawing.

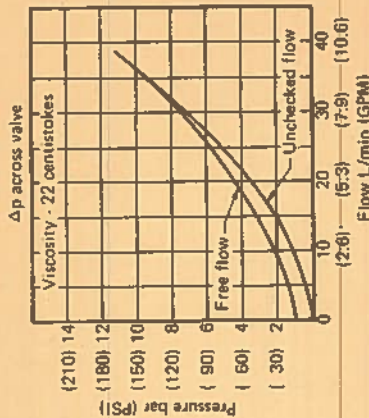
Directional Valve: DG4V-3 valves with cylinder ports open or partially open to tank in center position are recommended (spool types 0, 3, 6, 7, and 33).

## SPERRY VICKERS T.M.

## PILOT OPERATED CHECK VALVE MODULES

MODEL DGMPC-20 DESIGN  
MANIFOLD OR SUBPLATE MOUNTING

### TYPICAL PERFORMANCE CURVES



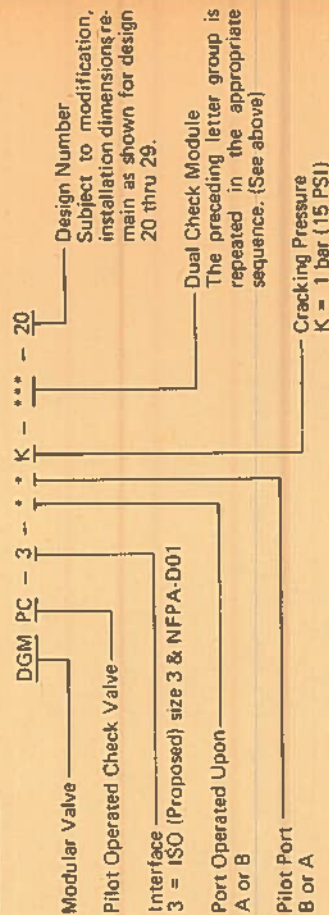
### STANDARD GRAPHICAL SYMBOLS FOR FLUID POWER DIAGRAMS

DGMPC-3-ABK-BAK-20



For single check omit one check in symbol.

### Model Code





## General Data

The mounting elements described below can be used for Series DGM\*\*3 modular valve systems and for Series DG4V-3 solenoid operated, DG17V-3 manually operated, and DG20V-3 mechanically operated directional control valves. If several modular valves are used in one vertical assembly then either the directional control valve or a crossover plate will terminate the assembly at the top.

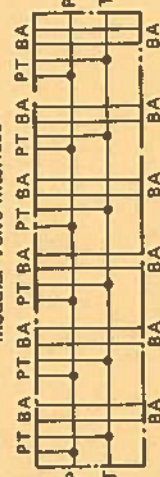
## Single Station Subplates

DGVM-3-10-S subplates are designed for individual mounting of one modular valve system or one directional control valve. All 4 system ports are located on the reverse side to the interface subplate and are suitable for pressures up to 350 bar (5000 PSI). A side port model is also available (DGMS-3-1E-10-S), which is the same size as the DGVM-3-10-S. All ports are SAE internal straight thread. Valves and modules are mounted with four 10-24 UNC screws. Both models have inch screw holes only.

## Multi-Station Manifolds

The use of multi-station manifolds permits 2 to 6 modular valve systems to be linked together. The respective supply and return lines are connected in parallel within the block. All connecting ports for the pressure supply and tank return lines are located on the end face of the manifold. Manifolds designed for linking 4 or more modular valve systems have both end faces provided with pressure and tank ports. Two and three station manifolds have connecting ports at one end only. All ports are SAE internal straight thread. The manifolds themselves are mounted by means of two M5-6g or two 10-24 UNC socket head screws and are suitable for pressures up to 250 bar (3600 PSI).

Modular Valve Interfaces



Actuator Ports

## Auxiliary Crossover/Blanking/Tapping Plates

Series DGMA crossover plates are used with modular valves not requiring directional control valves to terminate the vertical assembly. The model available connects ports P to A, and B to T (DGMA-3-C1-11).

Another version available for terminating valve stations is the blanking plate (DGMA-3-B-11). This can be used wherever one interface on multi-station manifold is not required. An additional system branch can then be conveniently added at a later stage.

Tapping plates are sandwich-type inserts that can be placed between the directional valve and module, between two modules, or between a module and manifold or subplate. Tapping plates are primarily used for a pressure gauge connection or a remote control function. Two models are available: a) to give access to ports A and B (DGMA-3-T1-11); b) to give access to ports P and T (DGMA-3-T2-11). Suitable for pressures up to 250 bar (3600 PSI).

## Note:

Before beginning to assemble individual modular elements with one of the above types of plate or onto an existing modular valve it must be insured that the mating surfaces are undamaged and completely clean in order to ensure a perfect seal.

## Mounting Bolts for Modular Valves

Mounting the various combinations of modular valves in vertical assemblies will require bolt kits of different lengths. These lengths can be determined from table 1 which indicates the height of the various modules. The overall stack height should be increased by 10mm (.39 in.) for each vertical assembly to allow for thread engagement in the subplate or manifold.

# SPERRY VICKERS

## SINGLE AND MULTIPLE STATION SUBPLATES

38 L/min (10 GPM) PER STATION, 250 bar (3600 PSI) (MODULES)  
350 bar (5000 PSI) (DG4V VALVE ONLY)

Table 1 Effective Bolt Length of Module

Model	Length mm (in.)
DGMA-3-B	10 (.39)
DGMA-3-C	20 (.78)
DGMA-3-T	20 (.78)
DG*V-3	40 (1.57)
DGMC*3	40 (1.57)
DGMX1-3	40 (1.57)
DGMR*3	40 (1.57)
DGMPC-3	40 (1.57)
DGMD-3	40 (1.57)
DGMFN-3	40 (1.57)

Example for ordering:

- 1 DG4V valve
- 1 DGMFN valve
- 1 DGMPC valve
- + Thread engagement
- Total bolt length

Bolt kit number BK466842M (metric) or BK466855 (inch).

Example using crossover plate:

- 1 DGMA-3-C1 crossover plate
- 1 DGMC-3-PT relief valve
- + Thread engagement
- Total bolt length

Bolt kit number BK466836M (metric) or BK466849 (inch).

## Bolt Kits for Modular Mounting

A range of bolt kits is available for mounting the various modules, normally topped with a DG4V-3 directional control valve. As the modules are of varying height it is necessary to calculate the height of the stack and then add 10 mm (.39 in.) for thread engagement. Table 2 contains a list of all possible bolt lengths for the modular system to ISO (Proposed) size 3 & NFPA-D01 interface.

Table 2 Bolt Length Selection Chart - Bolt Kits For Modular Valves

DG*V-3 Valve	Modular Valve	Tapping Plate	Blanking Plate	Crossover Plate	Thread Engagement	Total Bolt Length mm	Metric Thread M5-6g	Inch Thread 10-24 UNC-3A
40	40	20	10	10	10	20	BK466834M	BK466847
1	1	1	1	1	1	50	BKDG3-593M	BKDG3-638
1	1	1	1	1	1	80	BK466836M	BK466849
1	1	1	1	1	1	70	BK464125M	BKDGFN-694
1	1	1	1	1	1	80	BK466837M	BK466850
1	1	1	1	1	1	90	BK466838M	BK466851
1	1	1	1	1	1	100	BK466839M	BK466852
1	1	1	1	1	1	110	BK466840M	BK466853
1	1	1	1	1	1	120	BK466841M	BK466854
1	1	1	1	1	1	130	BK466842M	BK466855
1	1	1	1	1	1	140	BK466843M	BK466856
1	1	1	1	1	1	150	BK466844M	BK466857
1	1	1	1	1	1	160	BK466845M	BK466858
1	1	1	1	1	1	170	BK466846M	BK466859

Recommended Bolt Torque 5.6 Nm (50 lb. in.)

## NOTE:

This table serves as a guide in selecting the proper mounting bolt length for various combinations of modules, DG\*V valve and accessory plates. After the circuit is developed and the components to be stacked are predetermined, add the required lengths plus a 10 mm thread engagement for the subplate or manifold. Select the proper metric or inch thread bolt you desire to use and order by the bolt kit model number. All bolt kits include four (4) socket head screws.

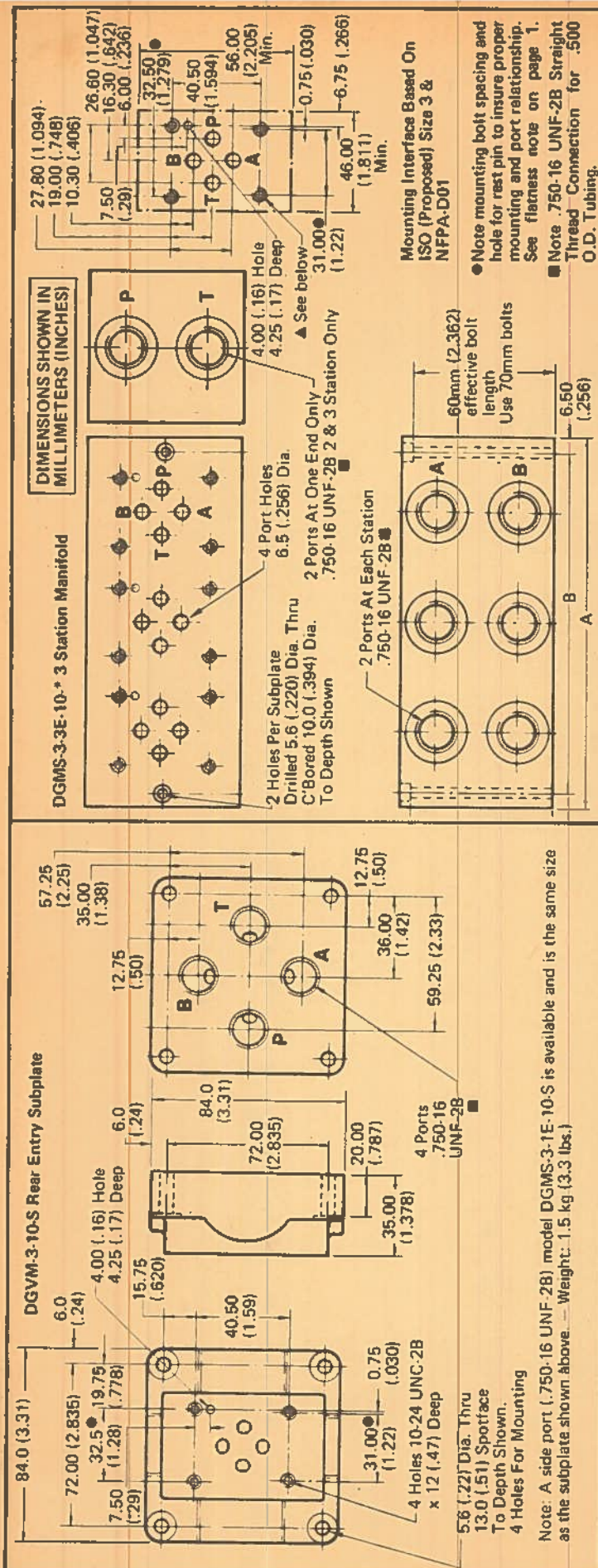
Example For Ordering:

- (1) DG4V Valve
- (1) DGMFN Module
- (1) DGMA-3-T1 Tapping Plate
- + Manifold Thread Engagement
- Total Bolt Length

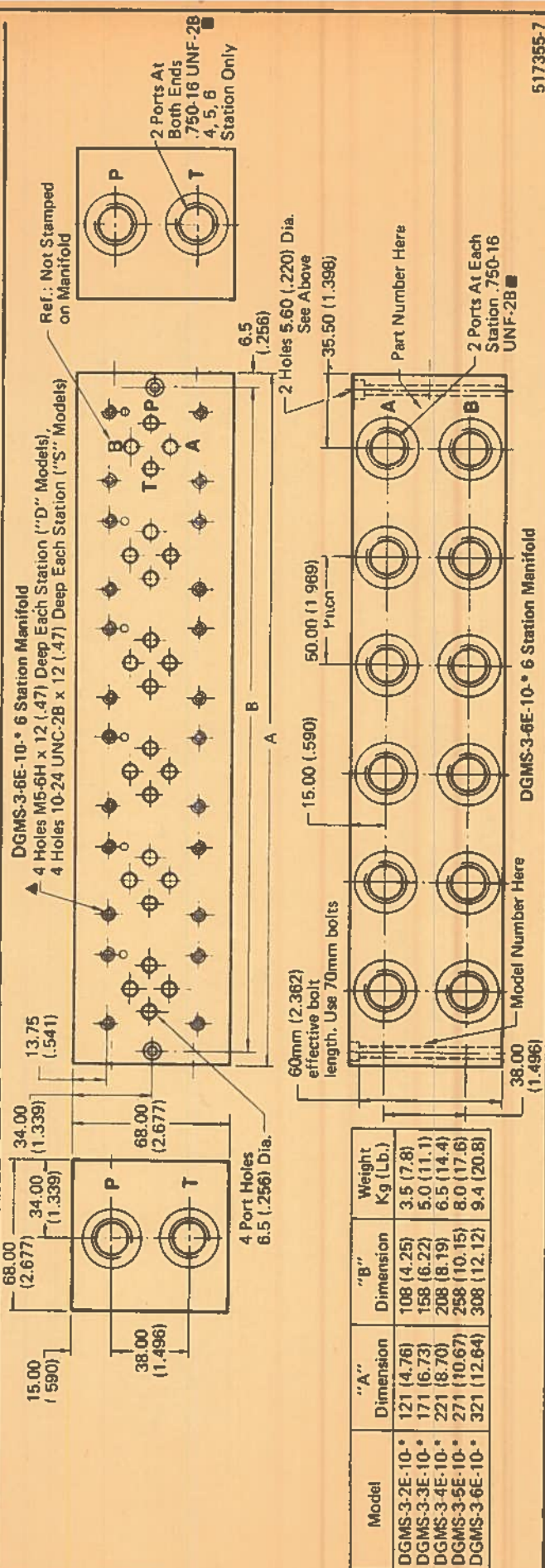
Order bolt kit number BK466840M (metric) or BK466853 (inch).

517355-6





Note: A side port (750-16 UNF-2B) model DGMS-3-1E-10-S is available and is the same size as the subplate shown above. Weight: 1.5 kg (3.3 lbs.)

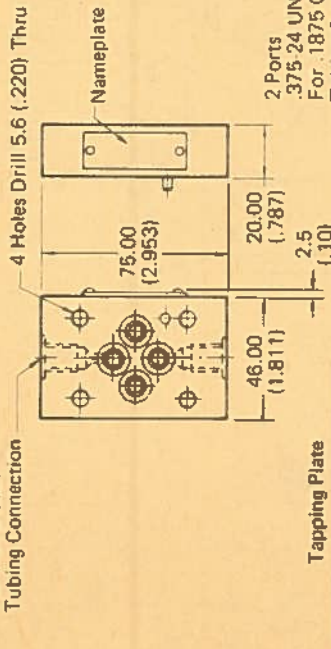




# AUXILIARY ACCESSORY PLATES

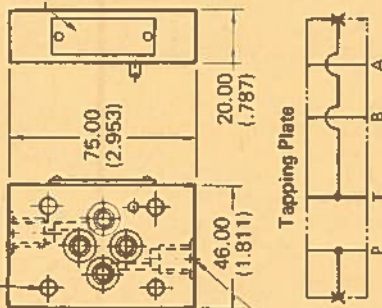
**DGMA-3-T1-11-S Tapping Plate**  
For Ports A and B

2 Ports  
.375-24 UNF-28  
For .1875 O.D.  
Tubing Connection



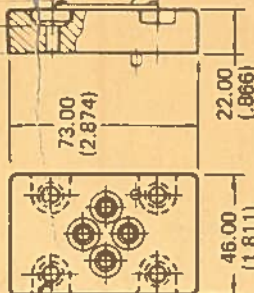
**DGMA-3-T2-11-S Tapping Plate**  
For Ports P and T

4 Holes Drill 5.6 (.220) Thru  
Nameplate



**DGMA-3-B-11 Blanking or Crossover Plate**

4 Holes Drill 5.6 (.220) Thru  
Thru C' Bore 10.0 (.39) Dia.  
To Depth Shown



**Blanking Plate (DGMA-3-B-11)**

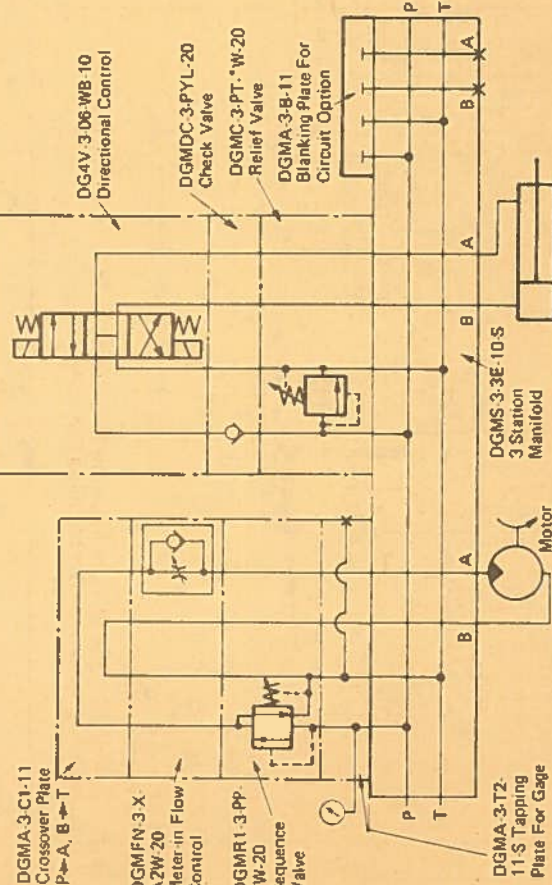


**Crossover Plate (DGMA-3-C1-11)**



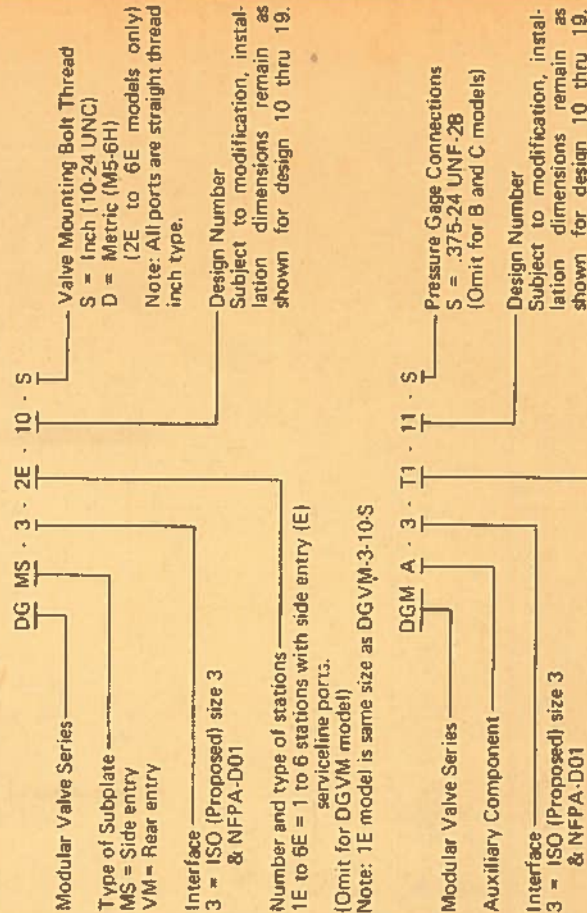
**DIMENSIONS SHOWN IN MILLIMETERS (INCHES)**

**Example of Use of Crossover, Blanking, and Tapping Plates**



Cylinder operation is complete before unidirectional fluid motor starts at a controlled speed.

## Model Codes — Accessories



Function  
B = Blanking plate  
C1 = Crossover plate P to A, B to T  
T1 = Tapping plate A and B ports  
T2 = Tapping plate P and T ports



SPERRY VICKERS  
TROY, MICHIGAN 48064

DIRECTIONAL  
CONTROLS

MOUNTING  
ADAPTER PLATE

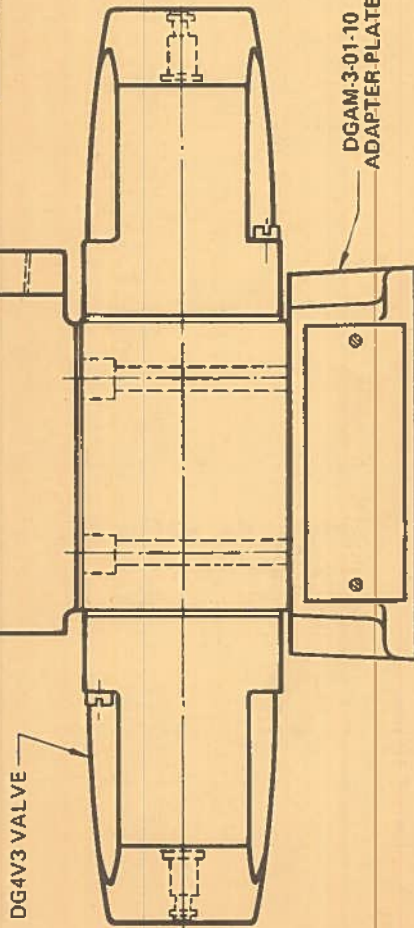
ADAPTS DG4V3 VALVE  
TO DG4S4-01\*\*5\*  
SUBPLATE OR MOUNTING PAD

DWG. NO.  
517360

SPERRY VICKERS  
T.M.

# MOUNTING ADAPTER PLATE

MODEL DGAM-3-01-10

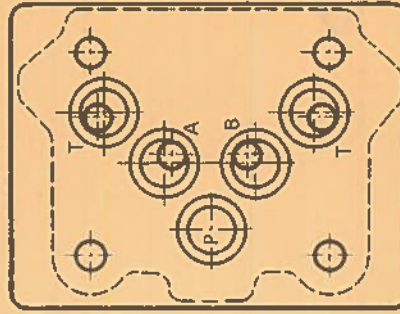
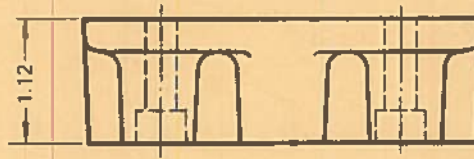
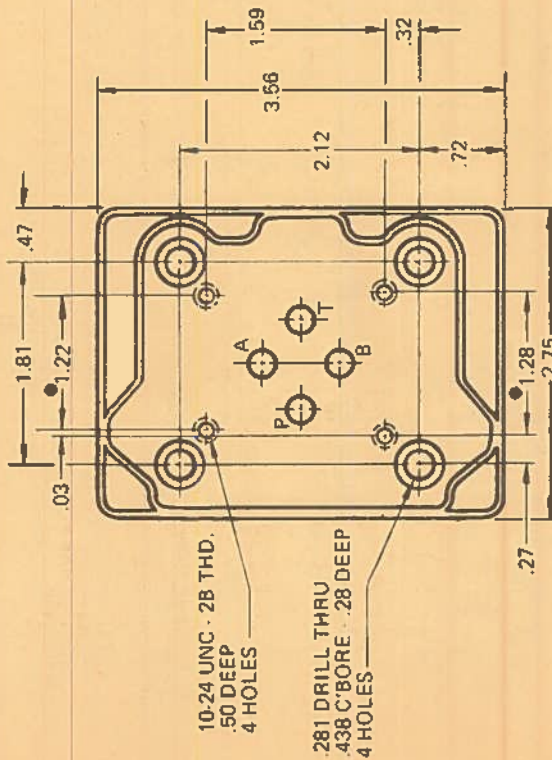


DG4V3 VALVE

DGAM-3-01-10  
ADAPTER PLATE

THIS ADAPTER PLATE AND THE DG4V3 (DWG. 517350) DIRECTIONAL VALVE CAN BE USED IN PLACE OF THE DG4S4-01\*\*5\* DIRECTIONAL VALVE (DWG. 517401A).

THE VALVE AND ADAPTER PLATE ARE MOUNTED ON THE DG4S4-01\*\*5\* SUBPLATE OR CUSTOMERS MACHINED PAD.



ALL HOLES IN THIS FACE CORRESPOND TO 1 HOSE IN FACE OF DG4S4-01\*\*5\*.

NOTE MOUNTING  
BOLT SPACING  
FOR PROPER  
MOUNTING AND  
PORT RELATION-  
SHIP

ALL HOLES EXCEPT 4 CORNER HOLES  
IN THIS FACE CORRESPOND TO THOSE  
IN FACE OF DG4V3.

MOUNTING SCREWS AND "O" RING  
SEALS ARE SUPPLIED FOR MOUNTING  
THIS ADAPTER PLATE.

RELEASED 12-1-76

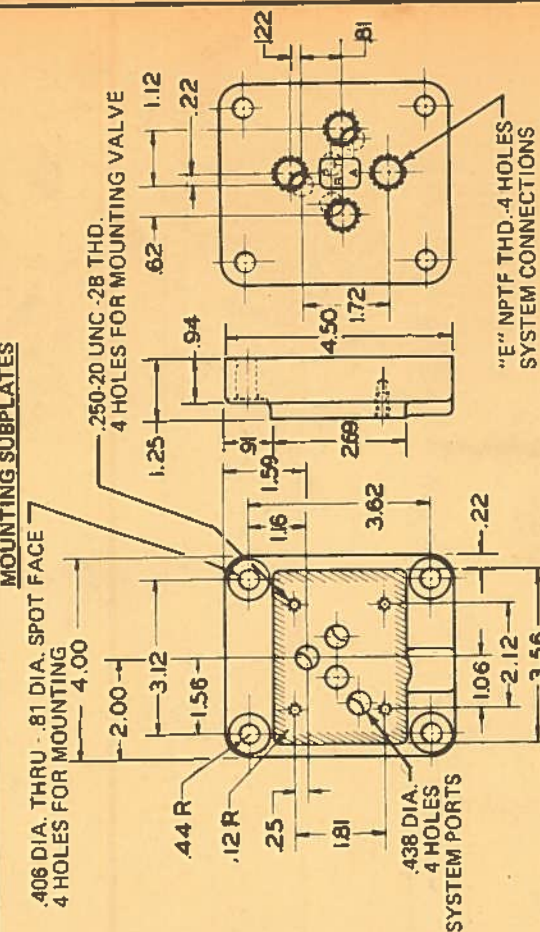
517360



## TWO- AND FOUR-WAY DIRECTIONAL VALVES - SOLENOID OPERATED

**SERIES DG4S2-01 & DG4S4-01  
MANIFOLD OR SUBPLATE MOUNTING**

## MOUNTING SUBPLATES



MODEL NUMBERS	"E" NPTF THREAD
DGSM-01X-10	3/8
DGSM-01Y-10	1/2
●DGSM-01Z-10	3/4

**SUBPLATES AND BOLT KITS**  
VALVES, SUBPLATES AND MOUNTING BOLTS MUST BE ORDERED SEPARATELY.

EXAMPLE: ONE (1) DG4S4-012C-50 VALVE  
ONE (1) DGSM-01X-10 SUBPLATE  
ONE (1) BKDG01-633 BOLT KIT

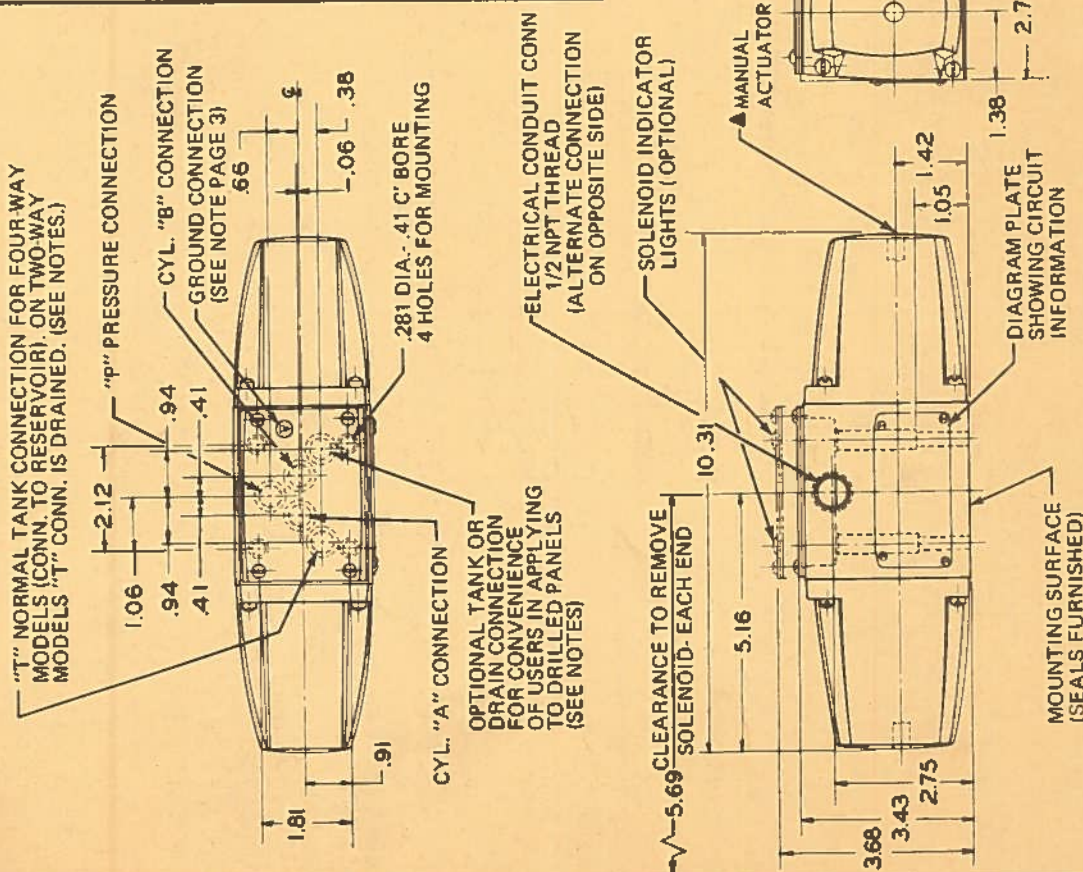
MAXIMUM RECOMMENDED BOLT TORQUE..... 112 lbf-in  
NOTE: ORDER BOLT KIT BKXDG01-634 FOR VALVES FOR HAZARDOUS  
LOCATIONS AND MINING APPLICATIONS.

SIDE CONNECTION SUBPLATES ALSO ARE AVAILABLE WITH 3/8" AND 1/2" PIPE THREADS. SEE DRAWING NO. 522600 SECTION L.

WHEN SUBPLATE IS NOT USED, A MACHINED PAD (AS INDICATED BY SUB-  
PLATE SHADED AREA) MUST BE PROVIDED FOR MOUNTING; PAD MUST BE  
FLAT WITHIN .0005 INCH AND SMOOTH WITHIN 63 MICROINCH. MOUNTING  
BOLTS, WHEN PROVIDED BY CUSTOMER, SHOULD BE SAE GRADE 7, OR  
BETTER.

BETTER.  
FOR INTERCHANGEABILITY WITH 1/4" SIZE DG-02 VALVES AND SOME  
OTHER BRANDS. SEE DRAWING 517500 IN SECTION K.

● SEE DRAWING 522590 SECTION K FOR SUBPLATES WITH ENLARGED PORTS. 517401



## DOUBLE SOLENOID, NO-SPRING DE-TENTED & SPRING CENTERED MODELS

▲ ALL VALVES WITH THE EXCEPTION OF THOSE HAVING HAZARDOUS DUTY SOLENOIDS HAVE MANUAL ACTUATORS.

REVISED 11-1-78

SEC  
f

DWG. NO.  
517401A

SPRING CENTERED,  
SPRING OFFSET, NO-  
SPRING DETENTED

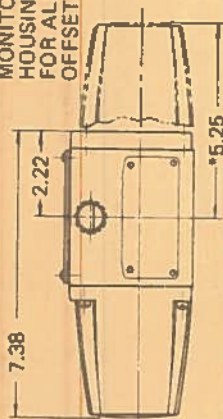
**FOR 3/8" OR  
1/2" PIPING**

**SINGLE AND  
DOUBLE SOLENOID  
OPERATED**

**TO 20 GPM  
& 3000 PSI**



**SINGLE SOLENOID, SPRING-OFFSET MODELS DG4S2-012A-50 & DG4S4-012A-50 & SDG4S\*-01\* WITH MONITOR SWITCH HOUSING (SAME FOR ALL SPRING OFFSET MODELS)**



SPRING OFFSET MODELS - WHEN SOLENOID IS DE-ENERGIZED, THE SPOOL IS RETURNED TO THE OFFSET POSITION.  
\*DIMENSION FOR SPRING OFFSET MODEL WITH MONITOR SWITCH, MODELS SDG4S2-012A-50 & SDG4S4-012A-50.

INTEGRAL MONITOR SWITCH PERMITS ELECTRICAL INTER-LOCKING OF VARIOUS HYDRAULIC CONTROLLED MOTIONS WITHOUT RESORTING TO EXTERNAL MECHANICAL CONTROLS. SWITCH MONITORS VALVE SPOOL POSITION AND MAY BE WIRED INTO CONTROL CIRCUIT.

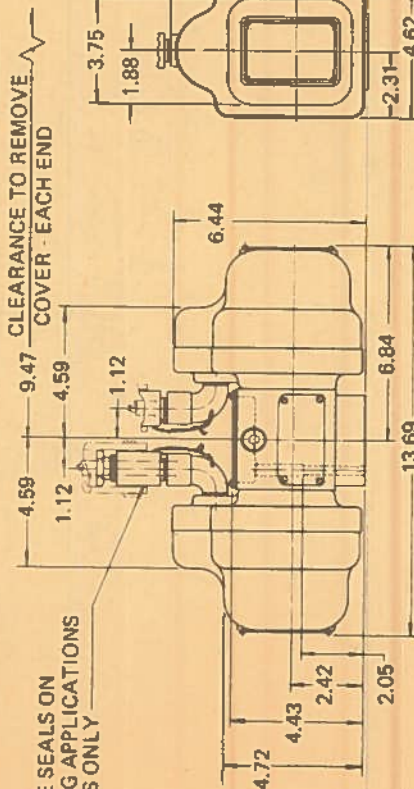
MONITOR SWITCH DATA: PLUNGER TYPE - PANEL MOUNTING - SINGLE-POLE-DOUBLE THROW CONTACT ARRANGEMENT - "A" NORMALLY CLOSED - "B" NORMALLY OPEN.  
MONITOR SWITCH HOUSING DOES NOT PROVIDE FOR MANUAL OPERATION.

**ELECTRICAL RATINGS**

VOLTS	AC-amp	DC amp
28	20	10
125	20	0.5
250	20	0.2
480	20	
600	5	

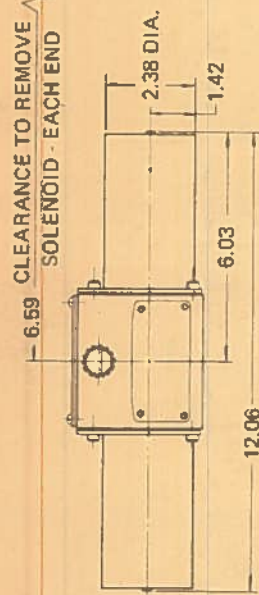
**DOUBLE SOLENOID, NO-SPRING DETENTED & SPRING CENTERED MODELS**

CABLE SEALS ON MINING APPLICATIONS SERIES ONLY

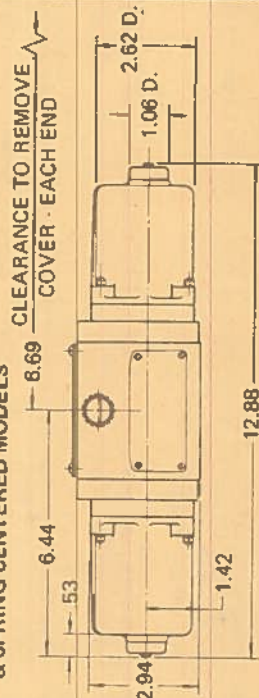


**VALVES FOR HAZARDOUS LOCATIONS & MINING APPLICATIONS**

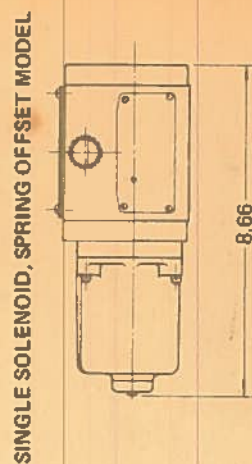
**DOUBLE SOLENOID, NO-SPRING DETENTED & SPRING CENTERED MODELS**



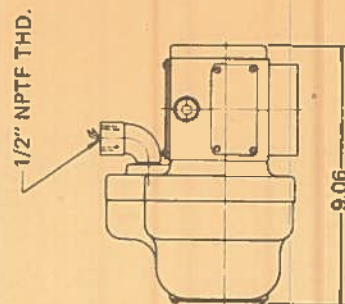
**DOUBLE SOLENOID, NO-SPRING DETENTED & SPRING CENTERED MODELS**



**VALVES WITH OIL IMMERSED SOLENOIDS**



**SINGLE SOLENOID, SPRING OFFSET MODEL**



VALVES HAVE "UL LISTED" SOLENOIDS FOR USE IN HAZARDOUS LOCATIONS - CLASS I GROUP D, CLASS II GROUP E-F-G, FOR 115 AND 230 V ac, 60 Hz SERVICE.  
VALVES FOR MINING APPLICATIONS ARE BUILT TO MSHA SCHEDULE 2G-FILE X/P837-2. AVAILABLE IN ALL STANDARD VOLTAGES.



# INSTA-PLUG FEATURES

THE INSTA-PLUG CONSISTS OF THE FOLLOWING FEATURES:

1. SECTION "A", A FOUR-PRONGED SELF-ALIGNING ELECTRICAL PLUG SECURED IN A HOUSING THAT IS MOUNTED ON TOP CENTER OF THE VALVE BODY WHERE THE SOLENOID LEADS TERMINATE; OR:
2. A "B" COMPLETE INSTA-PLUG ASSEMBLY THAT INCLUDES THE "A" HOUSING ON TOP OF WHICH RESTS A SIMILAR HOUSING CONTAINING THE MATING RECEPTACLE. THE TWO HOUSINGS ARE KEYS TO ASSURE PROPER HOOK-UP.

THE TOP HOUSING IS REMOVED FROM THE LOWER ("A") HOUSING TO BREAK THE ELECTRICAL CONNECTIONS TO THE VALVE SOLENOIDS OR PRESSED ONTO THE "A" HOUSING TO COMPLETE THE CIRCUIT. THE ASSEMBLY IS HELD TOGETHER BY TWO SLOTTED THUMB SCREWS.

A NAMEPLATE AND SOLENOID INDICATOR LIGHTS ARE PART OF THE RECEPTACLE WHEN SPECIFIED. CONNECTIONS TO THE ELECTRIC POWER ARE MADE THROUGH THE END OF THE RECEPTACLE HOUSING AND CAN BE PREPARED BY THE CUSTOMER. END LOCATION OF ELECTRICAL CONDUIT PORT PERMITS SPACE-SAVING SIDE-BY-SIDE VALVE MOUNTING.

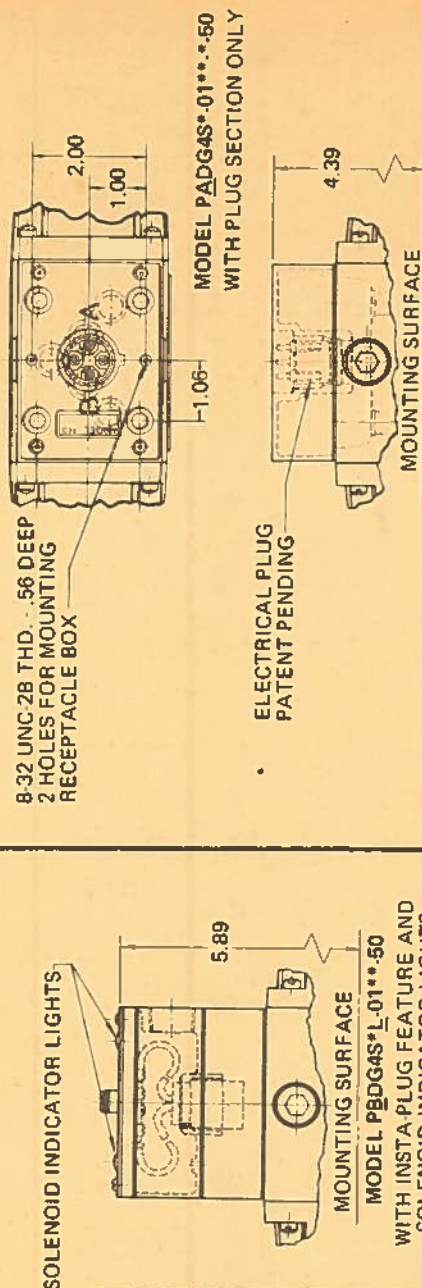
WIRE LEADS APPROXIMATELY 7" LONG ARE PROVIDED WHEN NO LIGHTS ARE SPECIFIED. MODELS WITH LIGHTS HAVE TERMINALS INSIDE THE RECEPTACLE HOUSING.

AFTER INITIAL INSTALLATION, ELECTRICAL AND HYDRAULIC CONNECTIONS NEED NOT BE DISTURBED WHEN VALVE WITH INSTA-PLUG IS REMOVED.

## NOTE:

SOLENOIDS "A" AND "B" ARE IDENTIFIED ON THE PLUG-IN AND RECEPTACLE HOUSINGS; THEY CORRESPOND WITH SOLENOID IDENTIFICATION PLATE. IN CASE OF TANDEM VALVES (NO. 8 SPOOL AND L.H. MODELS), THE INSTA-PLUG IS ROTATED 180° AND CONDUIT CONNECTION IS ON THE OPPOSITE END THAN THAT SHOWN.

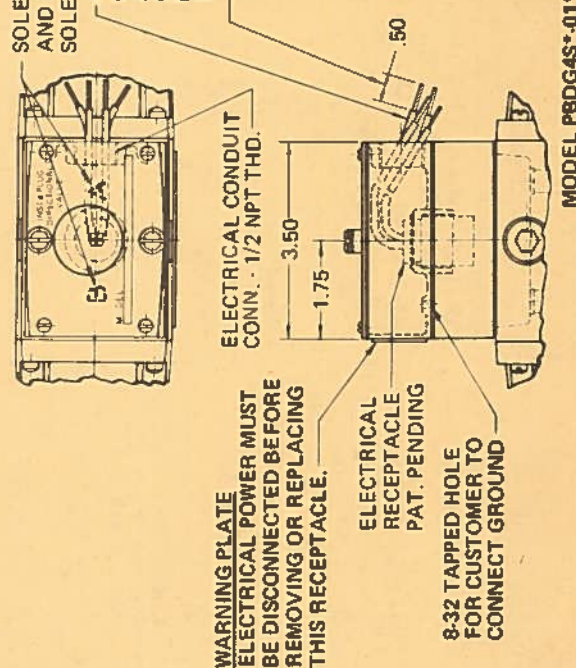
WEIGHT (APPROX.) INSTA-PLUG ONLY: ..... 1.0 LB.



SOLENOIDS "A" AND "B" ARE IDENTIFIED ON THE PLUG AND RECEPTACLE CASTINGS AND CORRESPOND WITH SOLENOID IDENTIFICATION PLATE.

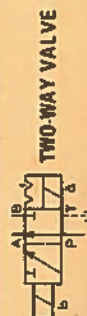
4 LEADS APPROX. 7.00 LONG. WHITE LEADS ARE CONNECTED TO SOLENOID "A" AND BLACK LEADS ARE CONNECTED TO SOLENOID "B" (SEE DIAGRAM PLATE). FOR TYPE 8 SPOOL AND LEFT HAND MODELS CONDUIT CONNECTION LOCATION IS REVERSED.

STRIPPED AND TWISTED WIRE - 4 LEADS (2 LEADS ON SPRING OFFSET MODELS)



## TYPICAL GRAPHICAL SLIDING SPOOL SYMBOLS

### NO-SPRING DETENTED



TWO-WAY VALVE



FOUR-WAY VALVE

### SPRING CENTERED



TWO-WAY VALVE



FOUR-WAY VALVE

### SPRING OFFSET



TWO-WAY VALVE



FOUR-WAY VALVE



**GENERAL USAGE**  
THE ELECTRICAL ACCESSORIES ARE AVAILABLE ON THE BASIC DG4S\*01\* DIRECTIONAL CONTROLS AND ALL VALVES THAT USE THE DG4S401\* AS A PILOT VALVE. AN ELECTRICAL WIRING DIAGRAM IS PROVIDED ON THE BOTTOM OF THE NAMEPLATE, AND SHOWN BELOW, FOR INSTALLATION INSTRUCTIONS.

**LIGHTS (L)**

LIGHTS ARE "ON" WHEN THERE IS CURRENT AT THE SOLENOIDS. (ONLY DOUBLE LIGHTS ARE AVAILABLE.) LIGHTS ARE AVAILABLE WITH ANY OPTION EXCEPT "T" (THE LIGHT OPTION HAS AN INTEGRAL TERMINAL STRIP) AND ARE FOR USE WITH 100 THRU 125 AND 192 THRU 233 VOLT SERVICE SOLENOIDS ONLY. THEY ARE NOT AVAILABLE FOR HAZARDOUS DUTY TYPE MODELS.

**WIRING HOUSING (W)**

THE WIRING HOUSING (W) IS A 1.56" HIGH RISER BLOCK MOUNTED ON TOP OF THE PILOT VALVE. A 1/2" NPTF THREAD CONNECTION IS PROVIDED IN ONE END OF THE HOUSING. THE HOUSING CAN BE ROTATED 180° IF THE CONNECTION IS REQUIRED ON THE OPPOSITE END. THIS CONNECTION WILL READILY ACCEPT COMMON ELECTRICAL QUICK DISCONNECT ASSEMBLIES ON THE MARKET. THE WIRING HOUSING IS AVAILABLE WITH ALL OPTIONS.

**TERMINAL STRIP (T)**

A TERMINAL STRIP (T) IS PROVIDED FOR EASE IN ELECTRICAL WIRING AND CONSISTS OF EIGHT (8) NO. 5-40 SCREW POSTS DIVIDED INTO FOUR TERMINALS. THE TERMINAL STRIP IS NOT AVAILABLE BY ITSELF OR WITH LIGHT PACKAGE "L" AS IT HAS INTEGRAL TERMINAL CONNECTIONS. AVAILABLE ONLY WITH WIRE HOUSING OPTION "W".

**CIRCUIT BREAKERS (B)**

CIRCUIT BREAKERS ARE PROVIDED TO PROTECT THE SOLENOIDS FROM ELECTRICAL BURN OUT. THE CIRCUIT BREAKER WILL OPEN IF THE CURRENT TO THE SOLENOID SHOULD RISE ABOVE NORMAL OPERATING LEVELS WHEN BOTH SOLENOIDS ARE ENERGIZED SIMULTANEOUSLY OR THE SPOOL FAILS TO SHIFT. WHEN THE CIRCUIT BREAKER OPENS, A RED FAULT LIGHT ILLUMINATES INDICATING THAT A MALFUNCTION HAS OCCURRED. AFTER THE CAUSE OF THE MALFUNCTION HAS BEEN ELIMINATED, PRESS THE RESET BUTTON TO PERMIT THE SOLENOID TO OPERATE AGAIN. FAULT LIGHTS ARE STANDARD WITH THE CIRCUIT BREAKER OPTION. CIRCUIT BREAKERS ARE AVAILABLE FOR VALVES WITH EITHER SINGLE OR DOUBLE SOLENOIDS, WITH 115 VOLTS 60 H<sub>2</sub> ONLY. (ADD "W" FOR VALVES WITH DOUBLE SOLENOIDS.)

**WIRING HOUSING - CIRCUIT BREAKER - TERMINAL STRIP - LIGHTS FOR DG4S\*/DG5S4/DF5S4 VALVES**

TION HAS OCCURRED. AFTER THE CAUSE OF THE MALFUNCTION HAS BEEN ELIMINATED, PRESS THE RESET BUTTON TO PERMIT THE SOLENOID TO OPERATE AGAIN. FAULT LIGHTS ARE STANDARD WITH THE CIRCUIT BREAKER OPTION. CIRCUIT BREAKERS ARE AVAILABLE FOR VALVES WITH EITHER SINGLE OR DOUBLE SOLENOIDS, WITH 115 VOLTS 60 H<sub>2</sub> ONLY. (ADD "W" FOR VALVES WITH DOUBLE SOLENOIDS.)

**GROUNDING**

A DRILLED HOLE IS PROVIDED FOR A NO. 8 SELF TAPPING SCREW WHICH WILL PERMIT A GROUND WIRE TO BE SECURED TO THE PILOT VALVE BODY. (NOT SHOWN ON THIS DRAWING). THE WIRING HOUSING AND CIRCUIT BREAKER HOUSING HAVE CAST HOLES WHICH ALSO PERMIT SECURING A GROUND WIRE WITH CUSTOMER'S NO. 8 SELF TAPPING SCREW. UNITS CAN BE SERIES GROUNDED IF DESIRED. THE DG4S\*01 PILOT VALVE BODIES HAVE A CAST "GROUND SYMBOL" ADJACENT TO THE DRILLED HOLE.

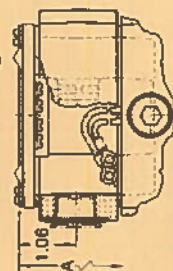
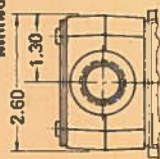
**RELATED INSTALLATION DRAWINGS**

MODELS	DRAWING NO.	MODELS	DRAWING NO.
DG4S*01*5*	517401	DG5S4-H06*5*	517920
DG5S4-06*5*	517900A	DG5S4-10*5*	518000A
		DF5S4-16*5*	518100

ELEC. ACCESS. MODEL CODE	"A", ADD ON DIM. SEE RELATED INSTALL. DWG. (4)	LIGHTS	WIRING HOUSING	TERMINAL STRIP	CIRCUIT BREAKER
"W"	1.56		●		
"LW"	1.56	●	●		
"WT"	1.72		●	●	
"B" SINGLE	1.56				●
"LB" SINGLE	1.56	●			●
"WB"	3.12		●		●
"LWB"	3.12	●	●		●
"WTB"	3.28		●	●	●

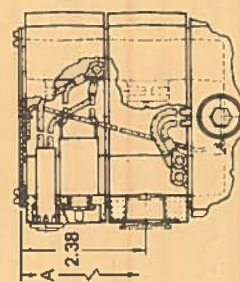
NOTE: ELECTRICAL ACCESSORIES SHOWN ARE NOT AVAILABLE WITH HAZARDOUS DUTY TYPE UNITS.

**WIRING HOUSING MODELS D\*\*S\*W (1) 2.56 WIDE (TYP.)**

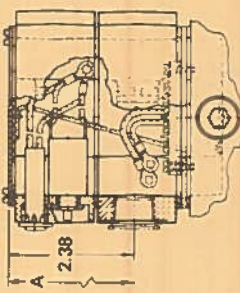


ELECTRICAL CONDUIT CONN. - 1/2 NPTF THREAD (FOR "W", "WT", "WTB", "WB", "LW" & "LWB" MODELS)

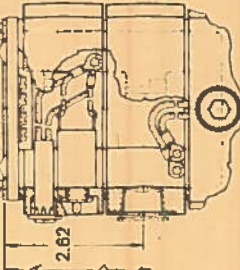
**WIRING HOUSING AND CIRCUIT BREAKER MODELS D\*\*S\*WB (2)**



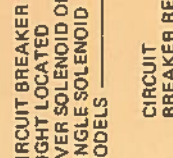
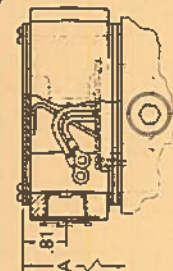
**WIRING HOUSING, TERMINAL STRIP AND CIRCUIT BREAKER MODELS D\*\*S\*WTB (2)**



**LIGHTS, WIRING HOUSING AND CIRCUIT BREAKER MODELS D\*\*S\*LWB (2)**



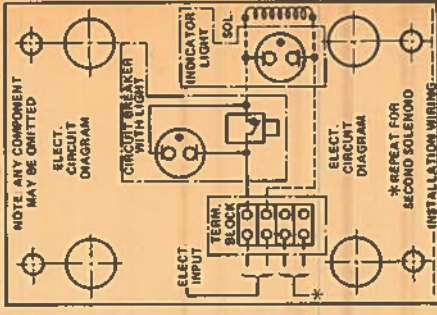
**WIRING HOUSING AND TERMINAL BLOCK MODELS D\*\*S\*WT (2)**



CIRCUIT BREAKER LIGHT LOCATED OVER SOLENOID ON A SINGLE SOLENOID MODELS

CIRCUIT BREAKER RESET

**ELECTRICAL DIAGRAM**



ELECTRICAL CONDUIT CONN. - 1/2 NPTF THREAD (FOR "B" & "LB" MODELS) (ALTERNATE CONN. ON OPPOSITE SIDE)

NOTE: CIRCUIT BREAKER AND CIRCUIT BREAKER LIGHT ARE ON BOTH ENDS OF DOUBLE SOLENOID MODELS.

FOR TYPE "4" & "B" SPOOLS CONDUIT CONNECTION LOCATION ON END OF "W" WIRING HOUSING IS REVERSED.

SEE MODEL CODE.

"GROUND" PROVIDED FOR NO. 8 SELF-TAPPING SCREW ON SUBASSEMBLIES B & HOUSING W.

VALVE SERIES INSTALLATION DRAWING NUMBERS.



MODEL NUMBER			FLOW RATING (GPM)		MAXIMUM TANK LINE BACK PRESSURE (PSI)	DIRECTION OF OIL FLOW FOR VALVE SPOOL POSITIONS	
NO-SPRING DETENTED	SPRING CENTERED	SPRING OFFSET	SPPOOL TYPE	RECOMMENDED FLOW CAPACITY		WITH SPOOL IN CENTER POSITION 1. SPRING CENTERED - BOTH SOLENOIDS DE-ENERGIZED 2. ALL OTHER MODELS AT CENTER CROSSOVER	SEE NOTE "A" WITH SOLENOID "A" ENERGI- ZED OR SPRING OFFSET SEE NOTE "B" WITH SOLENOID "B" ENERGI- ZED
DG4S4-010N-50	DG4S4-010C-50		OPEN CENTER ALL PORTS		AT TIME SPOOL SHIFT IS REQUIRED 1000 PSI	PR. CYL. A & CYL. B → TANK	
DG4S4-012N-50	DG4S4-012C-50	DG4S4-012A-50	CLOSED CENTER ALL PORTS			PR. CYL. A & CYL. B BLOCKED	
	DG4S4-013C-50		CLOSED CENTER P AND B	10	AT TIME SPOOL SHIFT IS NOT REQUIRED 3000 PSI	PR. & CYL. B BLOCKED CYL. A → TANK	
DG4S4-016N-50	DG4S4-016C-50		CLOSED CENTER P ONLY			PR. BLOCKED CYL. A & CYL. B → TANK	PR. → CYL. A CYL. B → TANK
DG4S4-017N-50	DG4S4-017C-50		PR. TO A & B TANK BLKD.			PR. → CYL. A & CYL. B TANK BLOCKED	
	DG4S4-018C-50		TANDEM OPEN CROSSOVER	8		PR. → TANK	
DG4S4-0133N-50	DG4S4-0133C-50		CLOSED CENTER BLEED A & B	10		PR. BLOCKED CYL. A & CYL. B → TANK	
DG4S2-012N-50		DG4S2-012A-50	2-WAY	3	50 PSI DRAIN DO NOT PLUG TANK PORT	PR. CYL. A & CYL. B BLOCKED	PR. → CYL. A CYL. B BLOCKED

▲ SOLENOIDS "A" AND "B" ARE IDENTIFIED ON UNIT BY DIAGRAM PLATE ON SIDE OF VALVE.

→ FULL FLOW     $\frac{X}{A}$  → RESTRICTED FLOW

**RATINGS.** ..... SEE ABOVE

MAXIMUM FLOW IS DEPENDENT UPON THE VALVE TYPE USED AND IS SUBJECT TO VARIATION DUE TO CHANGES IN OPERATING PRESSURE OR TANK LINE BACK PRES- SURE. IF OPERATING PRESSURE AND TANK LINE BACK PRESSURE SIMULTANEOUSLY APPROACH MAXIMUM, OR IF HIGHER FLOW RATES ARE DESIRED, CONTACT THE SPERRY VICKERS REPRESENTATIVE IN YOUR AREA.

MAXIMUM OPERATING PRESSURE..... 3000 PSI  
MAXIMUM TANK LINE PRESSURE..... SEE ABOVE

PSI PRESSURE DROP CHART

SPOOL TYPE	RECOMMENDED FLOW CAPACITY (GPM)	P TO A	B TO T	P TO B	A TO T	CENTERED P TO T
0	10	28	24	28	33	33
2	10	31	35	31	40	
3	10	31	35	31	33	
6	10	31	31	31	33	
7	10	28	33	28	40	
8	8	21	24	21	28	
33	10	31	33	31	40	65

1. FIGURES IN THE PRESSURE DROP CHART GIVE APPROXIMATE PRESSURE DROPS ( $\Delta P$ ) WHEN PASSING FLOW OF 100 SSU FLUID(S) HAVING .885 SPECIFIC GRAVITY.

2. FOR ANY OTHER FLOW RATE ( $Q_1$ ), THE PRESSURE DROP ( $\Delta P_1$ ) WILL BE APPROXI- MATELY:  
 $\Delta P_1 = \Delta P (Q_1/Q)^2$

3. FOR ANY OTHER VISCOSITY(S), THE PRESSURE DROP ( $\Delta P$ ) WILL CHANGE AS FOLLOWS:

OTHER VISCOSITY(S) % OF $\Delta P$ (APPROX.)	75	150	200	250	300	350	400
	93	111	119	126	132	137	141

4. FOR ANY OTHER SPECIFIC GRAVITY ( $G_1$ )<sup>●</sup> THE PRESSURE DROP ( $\Delta P_1$ ) WILL BE APPROXIMATELY:  
 $\Delta P_1 = \Delta P (G_1/G)$

● SPECIFIC GRAVITY OF FLUID MAY BE OBTAINED FROM ITS PRODUCER. THE VALUE IS HIGHER FOR FIRE-RESISTANT FLUIDS THAN FOR OIL.



**SOLENOIDS**

SOLENOIDS ON MODELS LISTED ARE FOR 115 V ac - 60 Hz SERVICE. SOLENOIDS FOR OTHER VOLTAGES AND FREQUENCIES ARE AVAILABLE. SPECIFY IN MODEL NUMBER IF OTHER THAN 115 V ac - 60 Hz SERVICE IS DESIRED. SEE MODEL CODE.

SOLENOID CURRENT APPROX. MAXIMUM	INRUSH amps	HOLDING amps	HOLDING WATTS
115 V ac - 60 Hz	5.1	.61	
230 V ac - 60 Hz	2.55	.32	
460 V ac - 60 Hz	1.27	.16	
115 V ac - 50/60 Hz	(50) 3.25 - (60) 4.97	(50) .56 - (60) .59	24
6 V dc			24
12 V dc			24
24 V dc			24

**SOLENOID ENERGIZING**

SPRING CENTERED AND SPRING OFFSET TYPES WILL BE SPRING POSITIONED UNLESS SOLENOID IS ENERGIZED CONTINUOUSLY. NO-SPRING DETENTED VALVES MAY BE ENERGIZED MOMENTARILY, APPROXIMATELY 0.1 SECOND; WHEN SOLENOID IS DE-ENERGIZED SPOOL WILL REMAIN IN LAST POSITION ATTAINED PROVIDED THERE IS NO SHOCK, VIBRATION, OR UNUSUAL PRESSURE TRANSIENTS.

**MOUNTING POSITIONS**

NO SPRING DETENTED VALVES MUST BE INSTALLED WITH THE LONGITUDINAL AXIS HORIZONTAL FOR GOOD MACHINE RELIABILITY. MOUNTING POSITION OF SPRING-OFFSET AND SPRING-CENTERED MODELS IS UNRESTRICTED.

**DRAIN**

ON TWO WAY VALVES "T" IS DRAIN AND MUST BE CONNECTED DIRECTLY TO TANK THROUGH A SURGE FREE LINE SO THERE WILL BE NO BACK PRESSURE AT THIS PORT.

**MODEL CODE**

SPECIAL SEALS (OMIT IF NOT REQUIRED). SEE FLUIDS AND SEALS NOTE.

S - MONITOR SWITCH FOR SPRING OFFSET VALVES

X - SOLENOIDS FOR HAZARDOUS LOCATIONS

XM - SOLENOIDS FOR MINING APPLICATIONS. "X" OR "XM" NOT AVAILABLE ON PLUG-IN VALVES. (OMIT IF NOT REQUIRED)

ELECTRICAL INSTA-PLUG FEATURE (OMIT IF NOT REQUIRED)

INSTA-PLUG TYPE

"A" PLUG ONLY "B" PLUG AND RECEPTACLE

DIRECTIONAL CONTROL VALVE: SUBPLATE MOUNTING.

SOLENOID OPERATED, SLIDING SPOOL

2 - 2-WAY FLOW DIRECTION

4 - 4-WAY FLOW DIRECTION

**ELECTRICAL ACCESSORIES**

L - SOLENOID INDICATOR LIGHTS (FOR USE WITH 100 THRU 125 AND 192 THRU 233 VOLTAGE SERVICE ONLY) (NOT AVAILABLE FOR HAZARDOUS DUTY UNITS)

W - WIRING HOUSING

T - TERMINAL STRIP

B - CIRCUIT BREAKER(S) (FOR 115 V ac - 60 Hz ONLY) SINGLE SOLENOID VALVES. (ADD "W" FOR VALVES WITH DOUBLE SOLENOIDS.)

NOTE: SURGES OF OIL IN A COMMON TANK LINE SERVING THESE AND OTHER VALVES CAN BE OF SUFFICIENT MAGNITUDE TO CAUSE INADVERTENT SHIFTING OF THESE VALVES. THIS IS PARTICULARLY CRITICAL IN THE NO-SPRING DETENTED TYPE VALVES. SEPARATE TANK LINES OR A VENTED MANIFOLD WITH A CONTINUOUS DOWNWARD PATH TO TANK IS NECESSARY.

NOTE: ANY SLIDING SPOOL VALVE, IF HELD SHIFTED UNDER PRESSURE FOR LONG PERIODS OF TIME, MAY STICK AND NOT SPRING RETURN DUE TO FLUID RESIDUE FORMATION AND THEREFORE, SHOULD BE CYCLED PERIODICALLY TO PREVENT THIS FROM HAPPENING.

WHEN USED AS OTHER THAN A NORMAL 4-WAY VALVE, CONSULT YOUR VICKERS REPRESENTATIVE.

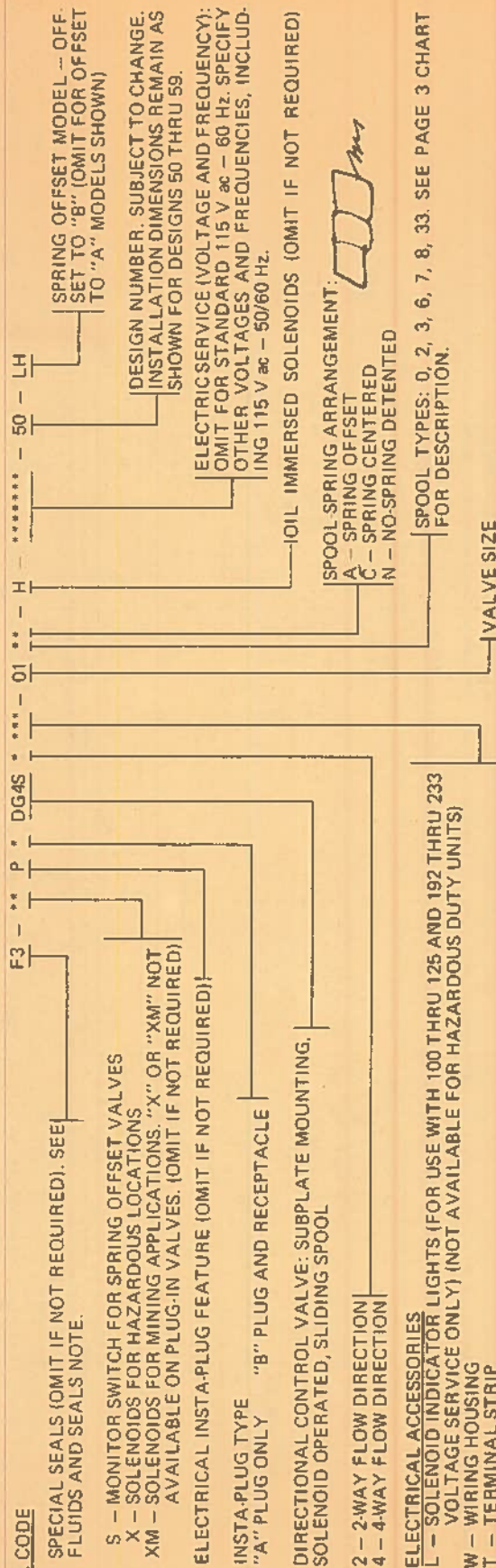
FILTRATION..... (10 MICRON NOMINAL) 35 MICRON ABSOLUTE

**FLUIDS AND SEALS**

THE USE OF SYNTHETIC, FIRE-RESISTANT FLUIDS REQUIRES A VALVE WITH SPECIAL SEALS. ADD PREFIX "F3" TO THE MODEL NUMBER WHEN PHOSPHATE ESTERS OR ITS BLENDS ARE TO BE USED. WATER GLYCOL, WATER-IN-OIL EMULSIONS AND PETROLEUM OIL MAY BE USED WITH STANDARD SEALS. REFER TO DATA SHEET I-286-S (SECTION K) FOR FLUID AND TEMPERATURE RECOMMENDATIONS.

WEIGHT LBS. (APPROX.) (FOR STANDARD AIR-COOLED SOLENOIDS ONLY)

SINGLE SOLENOID MODELS (EXCEPT PLUG-IN TYPE).....	9
SINGLE SOLENOID MODELS (PLUG-IN TYPE).....	10
DOUBLE SOLENOID MODELS (EXCEPT PLUG-IN TYPE).....	10-1/4
DOUBLE SOLENOID MODELS (PLUG-IN TYPE).....	11-1/4
SUBPLATES (EXCEPT PLUG-IN TYPE).....	4-1/2
SUBPLATES (PLUG-IN TYPE).....	8

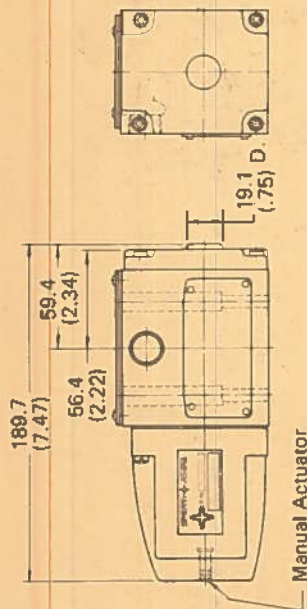








**SINGLE SOLENOID  
SPRING OFFSET MODELS  
DG4S2\*-012A-W\*-50 &  
DG4S4\*-01\*A-W\*-50 SERIES**



Standard solenoid position shown (except No. "8" spool in "B" models)  
Solenoid on opposite end for L.H. models

**Flow Ratings**

Valve Type	Spool Type	Recommended Flow Capacity litres/min (GPM)	Maximum Flow Without Malfunction litres/min (GPM)
No-Spring Detented 4-Way	0, 2, 6, 7, 33		
Spring Centered	0, 2, 3, 6, 7, 33	38 (10)	76 (20)
Spring Offset 4-Way	0, 2, 6		
Spring Centered	8	30.3 (8)	45.5 (12)
No-Spring Detented 2-Way			
Spring Offset 2-Way	2	11.3 (3)	11.3 (3)

**Solenoids**

Solenoids are identified by a letter in the model number. Example: DG4S4-012A-W-B-50

Solenoid Voltage Rating	Identification Letter	Inrush amps (rms)	Holding amps (rms)	Holding watts
115/120 V ac - 60 Hz 110 V ac - 50 Hz	B	3.3	70	37.0
230 V ac - 60 Hz 220 V ac - 50 Hz	D			
460 V ac - 60 Hz 440 V ac - 50 Hz	M			
12 V dc	G			
24 V dc	H			

● Maximum peak inrush amps approximately 1.4 x (rms) values shown.

**General Data**

The primary function of these four-way directional valves in a hydraulic circuit is to direct fluid flow. This, in turn, would determine the direction of movement of a fluid cylinder, or the direction of rotation of a fluid motor. These valves have wet armature type solenoids.

**Solenoid Energizing**

Spring centered and spring offset types will be spring positioned unless solenoid is energized continuously. No-spring detented valves may be energized momentarily, approximately 0.1 second; when solenoid is de-energized, spool will remain in last position attained provided there is no shock, vibration, or unusual pressure transients.

**Mounting Positions**

No-spring detented valves must be installed with the longitudinal axis horizontal for good machine reliability. Mounting position on spring-offset and spring-centered is unrestricted.

Note: Two-way offset valves must be mounted with the solenoid on the bottom when valves are installed in a vertical position.

**Drain**

On two-way valves "T" is drain. The drain line must incorporate a loop approximately (within .5 inches) level with the highest horizontal body dimension. This loop is required to provide a positive head of oil on the valve to insure a full tank chamber. This line must be free of surges.

Note: Surges of oil in a common tank line serving these and other valves can be of sufficient magnitude to cause inadvertent shifting of these valves. This is particularly critical in the no-spring detented type valves. Separate tank lines or a vented manifold with a continuous downward path to tank is necessary.

Note: Any sliding spool valve, if held shifted under pressure for long periods of time, may stick and not spring return due to fluid residue formation and, therefore, should be cycled periodically to prevent this from happening.

When used as other than a normal 4-way valve, consult your Sperry Vickers representative.

Filtration: ..... (10 Micron Nominal) 35 Micron Absolute

**Fluids and Seals**

The use of synthetic, fire-resistant fluids requires a valve with special seals. Add prefix "F3" to the model number when phosphate esters or its blends are to be used. Water glycol, water-in-oil emulsions and petroleum oil may be used with standard seals. Refer to data sheet I-286-S for hydraulic fluid and temperature recommendations.

**Weight Kg (Lbs.) (Approx.)**

Single Solenoid Models ..... 4.7 (10.3)  
Single Solenoid Models (Plug-in Type) ..... 5.1 (11.3)  
Double Solenoid Models ..... 5.5 (12.5)  
Double Solenoid Models (Plug-in Type) ..... 5.9 (13.5)  
Subplates ..... 1.8 (4.5)



Model Number			Spool Type	Spool Center Position	Description	Pressure Drop bar (PSI) @ 37.85 litres/min (10 GPM)				Maximum Tank Line Back Pressure bar (PSI)
No Spring Detented	Spring Centered	Spring Offset				P → A	B → T	P → B	A → T	P → T Cent.
DG4S4*-010N-W*-51	DG4S4*-010C-W*-50	DG4S4*-010A-W*-50	0		Open Center All Ports	1.93 (28)	1.65 (24)	1.93 (28)	2.28 (33)	2.28 (33)
DG4S4*-012N-W*-51	DG4S4*-012C-W*-50	DG4S4*-012A-W*-50	2		Closed Center All Ports	2.14 (31)	2.41 (35)	2.14 (31)	2.76 (40)	
	DG4S4*-013C-W*-50		3		Closed Center P & B	2.14 (31)	2.41 (35)	2.14 (31)	2.28 (33)	
DG4S4*-016N-W*-51	DG4S4*-016C-W*-50	DG4S4*-016A-W*-50	6		Closed Center P Only	2.14 (31)	1.65 (24)	2.14 (31)	2.28 (33)	
DG4S4*-017N-W*-51	DG4S4*-017C-W*-50		7		Open Center T Blocked	1.93 (28)	2.28 (33)	1.93 (28)	2.76 (40)	
	DG4S4*-018C-W*-50		8		Tandem Open Crossover	1.45 (21)	1.65 (24)	1.45 (21)	1.93 (28)	4.48 (65)
DG4S4*-0133N-W*-51	DG4S4*-0133C-W*-50		33		Closed Center Bleed A & B	2.14 (31)	2.28 (33)	2.14 (31)	2.76 (40)	
DG4S2*-012N-W*-51		DG4S2*-012A-W*-50	2	N.A.	Closed Center Crossover	2.14 (31)		2.14 (31)		3.45 (50) Drain Do Not Plug Tank Port

Solenoids "A" and "B" are identified on unit by diagram plate on side of valve.

→ Full Flow    X Restricted Flow

1. Figures in the pressure drop chart give approximate pressure drops ( $\Delta P$ ) when passing flow of 100 SSU fluid(s) having .865 specific gravity.

2. For any other flow rate ( $Q_1$ ), the pressure drop ( $\Delta P_1$ ) will be approximately:

$$\Delta P_1 = \Delta P (Q_1/Q)^2$$

3. For any other viscosity(s), the pressure drop ( $\Delta P$ ) will change as follows:

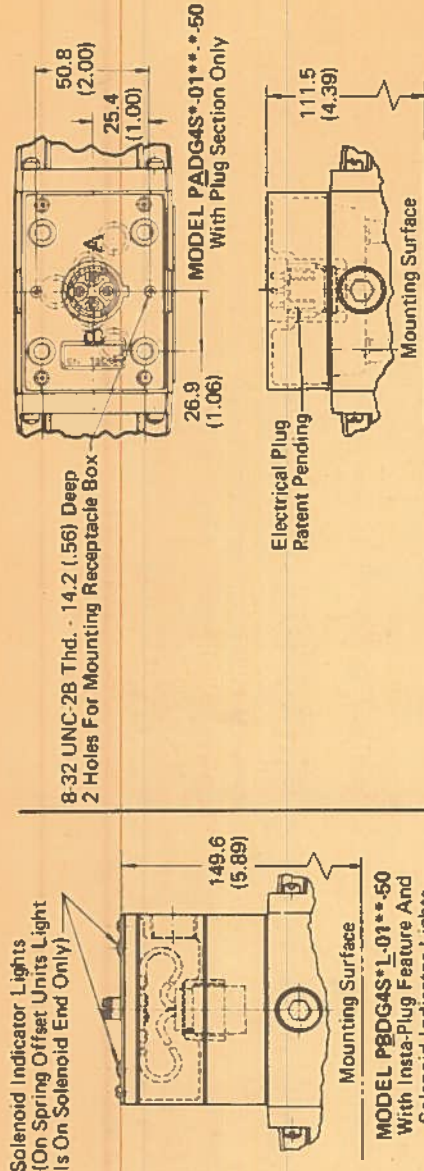
Other Viscosity(s) % of $\Delta P$ (Approx.)	75	150	200	250	300	350	400
	93	111	119	126	132	137	141

4. For any other specific gravity ( $G_1$ ), the pressure drop ( $\Delta P_1$ ) will be approximately:

$$\Delta P_1 = \Delta P (G_1/G)$$

Specific gravity of fluid may be obtained from its producer. The value is higher for fire-resistant fluids than for oil.





#### Insta-Plug Features

The insta-plug consists of the following features:

1. Section "A", a four-pronged self-aligning electrical plug secured in a housing that is mounted on top center of the valve body where the solenoid leads terminate; or:
2. A "B" complete insta-plug assembly that includes the "A" housing on top of which rests a similar housing containing the mating receptacle. The two housings are keyed to assure proper hook-up.

The top housing is removed from the lower ("A") housing to break the electrical connections to the valve solenoids or pressed onto the "A" housing to complete the circuit. The assembly is held together by two slotted thumb screws.

A nameplate and solenoid indicator lights are part of the receptacle when specified.

Connections to the electric power are made through the end of the receptacle housing and can be prewired by the customer. End location of electrical conduit port permits space-saving side-by-side valve mounting.

Wire leads approximately 177.8 mm (7.00) long are provided when no lights are specified. Models with lights have terminals inside the receptacle housing.

After initial installation, electrical and hydraulic connections need not be disturbed when valve with insta-plug is removed.

#### Note:

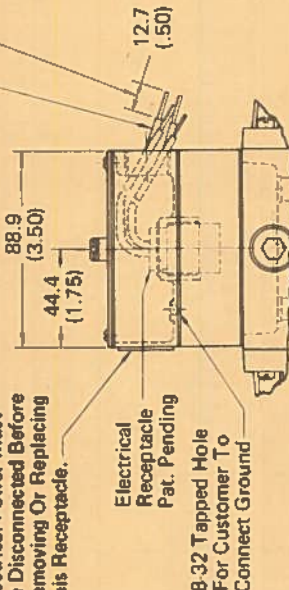
Solenoids "A" and "B" are identified on the plug-in and receptacle housings; they correspond with solenoid identification plate. In case of tandem valves (no. 8 spool and L.H. models), the insta-plug is rotated 180° and conduit connection is on the opposite end than that shown.

Weight (Approx.) insta-plug only. .... 1.0 lb.



Electrical Conduit Conn. - 1/2 NPTF Thd.

Warning Plate  
Electrical Power Must Be Disconnected Before Removing Or Replacing This Receptacle.

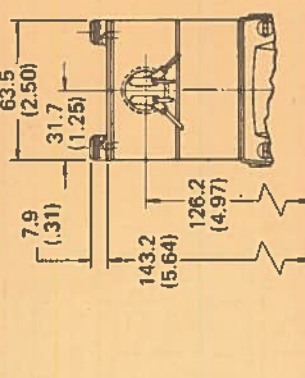


Electrical Receptacle Pat. Pending  
8-32 Tapped Hole For Customer To Connect Ground

Solenoids "A" and "B" are identified on the plug and receptacle castings and correspond with Solenoid Identification Plate.

4 Leads Approx. 177.8 mm (7.00) Long. White Leads are Connected to Solenoid "A" and Black Leads are Connected to Solenoid "B" (See Diagram Plate). For Type 8 Spool and Left Hand Models Conduit Connection Location is Reversed.

Striped and Twisted Wire - 4 Leads (2 Leads on Spring Offset Models)



MODEL PBDG4S\*01\*\*50

With Insta-Plug Feature (Without Solenoid Indicator Lights)

#### VALVE TYPE VS. SPOOL TYPE TYPICAL STANDARD GRAPHICAL SYMBOLS

Note: When solenoid "a" is energized, flow is always P → A. When solenoid "b" is energized, flow is always P → B. Spring Offset valves as shown (not LH) flow P → A in the offset position. Solenoid "a" and "b" are identified on the diagram plate.

NO-SPRING DETENTED	SPRING CENTERED	SPRING OFFSET
<p>DG4S2*01*N-W*51</p>	<p>DG4S4*01*C-W*50</p>	<p>DG4S4*01*A-W*50</p>

517410-3



## WIRING HOUSING - TERMINAL STRIP - LIGHTS FOR DG4S\*/DG5S4/DF5S4 VALVES

### General Usage

The electrical accessories options are available on the basic DG4S\*01\*W directional controls.

### Lights (L)

Lights are "on" when there is current at the solenoids. Lights are available with any option except "T". (The light option has an integral terminal strip) and are for use with 100 thru 233 and 192 thru 233 volt service solenoids only.

### Wiring Housing (W)

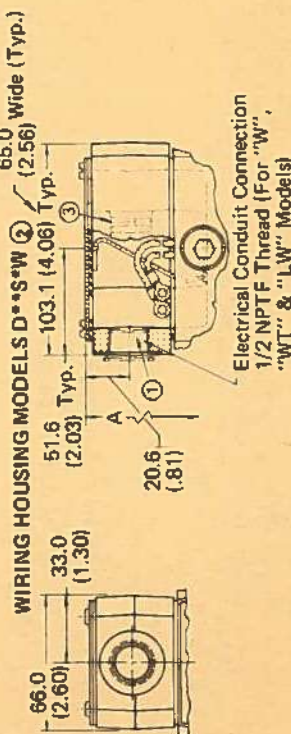
The wiring housing (W) is a 39.6 mm (1.56") high riser block mounted on top of the pilot valve. A 1/2" NPTF thread connection is provided in one end of the housing. The housing can be rotated 180° if the connection is required on the opposite end. This connection will readily accept common electrical quick disconnect assemblies on the market. The wiring housing is available with all options.

### Terminal Strip (T)

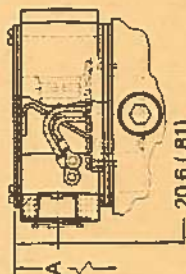
A terminal strip (T) is provided for ease in electrical wiring and consists of eight (8) no. 5-40 screw posts divided into four terminals. The terminal strip is not available by itself or with light package "L" as it has integral terminal connections. Available only with wire housing option "W".

### Grounding

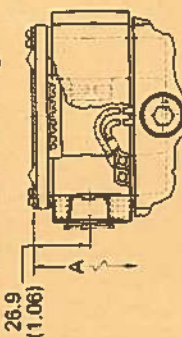
A drilled hole is provided for a customer's no. 8 self tapping screw which will permit a ground wire to be secured to the pilot valve body. (Not shown on this drawing.) The wiring housing has a cast hole ③ which also permits securing a ground wire with customer's no. 8 self tapping screw. Units can be series grounded if desired. The DG4S\*01 pilot valve bodies have a cast "ground symbol" adjacent to the drilled hole.



### WIRING HOUSING AND TERMINAL BLOCK MODELS D\*\*S\*WT ②



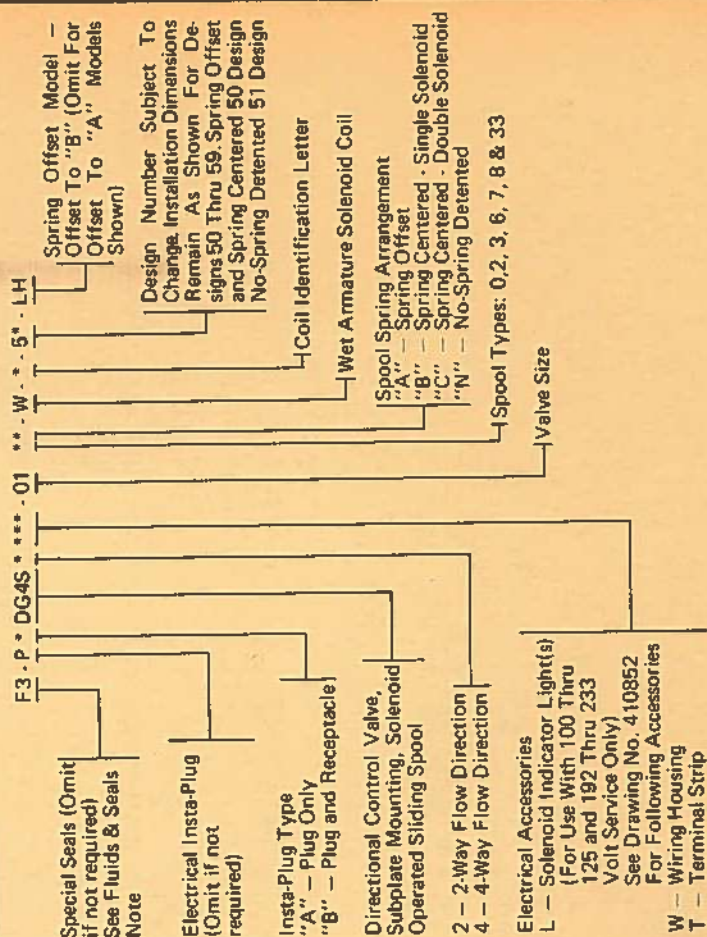
### LIGHTS AND WIRING HOUSING MODELS D\*\*S\*LW ②



Elec. Acces. Model Code	"A" - Add on Dim.	Lights	Wiring Housing	Terminal Strip
"W"	39.6 (1.56)		•	
"LW"	39.6 (1.56)	•	•	
"WT"	43.7 (1.72)		•	•

- ① For type "WT" spools conduit connection location on end of "W" wiring housing is reversed.
- ② See model code.
- ③ "Ground" provided for no. 8 self tapping screw on Housing W.

### Model Code





**SOLENOID CONTROLLED -  
PILOT OPERATED FOUR-WAY  
DIRECTIONAL VALVES**

MODEL SERIES DG5S4-04\*\*\_4\*

## GENERAL DATA

THIS NEW DESIGN PROVIDES A VALVE WITH A JIC WIRING CAVITY AND WET ARMATURE SOLENOIDS. MOUNTING IS THE SAME AS THE DG\*54\*04\*\*\*.\*\*\*.20 AND MOD-04 DESIGNS. (SEE SYMBOLS FOR CONNECTIONS AND NEW BOLT KIT.)

## DESCRIPTION

THESE VALVES ARE GENERALLY USED TO CONTROL THE DIRECTION OF FLOW IN A HYDRAULIC CIRCUIT. THIS, IN TURN, WOULD CONTROL THE DIRECTION OF MOVEMENT OF A WORK CYLINDER, OR THE ROTATION OF A FLUID MOTOR.

## SYSTEM PRESSURE

MAXIMUM OPERATING PRESSURE (SEE BELOW)..... 3000 PSI

## FLOW RATINGS

**FLOW RATINGS. . . . . SEE PAGE 2**

**MAXIMUM TANK LINE PRESSURE:**

EXTERNAL DRAIN MODELS.....	3000 PSI
----------------------------	----------

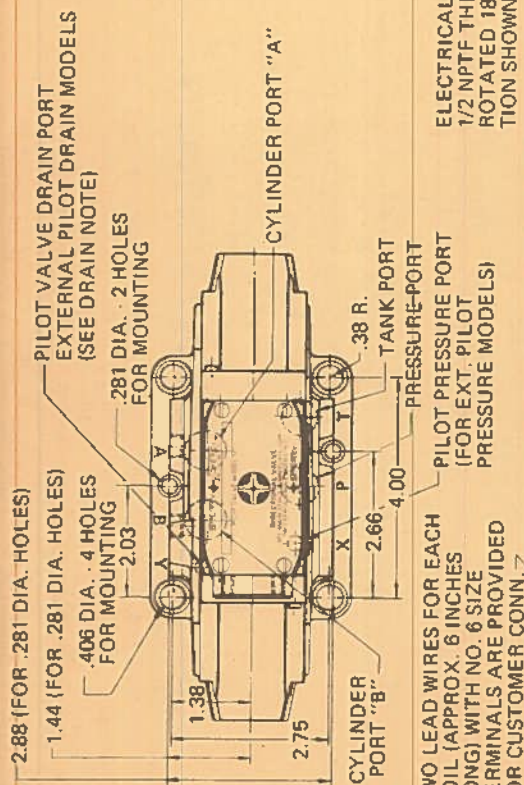
**INTERNAL DRAIN MODELS, . . . . . 1500 PSI**

**NOTE:** FOR INTERNALLY DRAINED MODELS THE TANK RETURN MUST BE DESIGNATED SO THAT PILOT VALVE TRANSIENT TANK PRESSURE PEAKS DO NOT EXCEED 2500 PSI (SEE PILOT VALVE DRAIN NOTE).

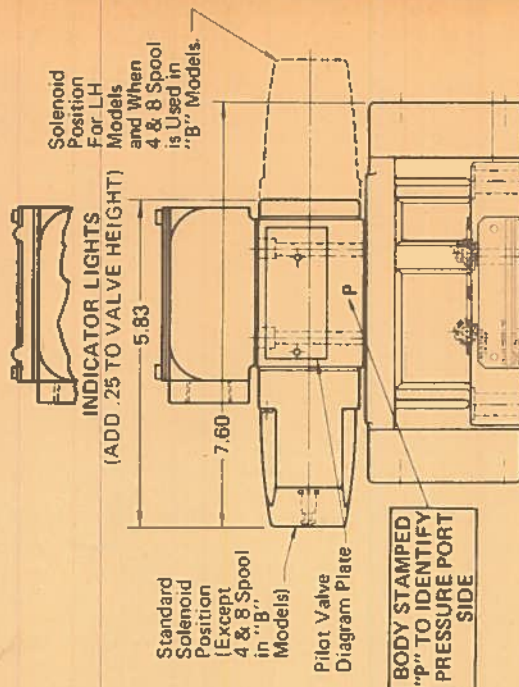
— TWO LEAD WIRES FOR EACH COIL (APPROX. 6 INCHES LONG) WITH NO. 6 SIZE TERMINALS ARE PROVIDED FOR CUSTOMER CONNECTION

— PILOT PRESSURE PORT (FOR EXT. PILOT PRESSURE MODELS)

— ELECTRICAL CONDUIT CONN. 1/2 NPTF THREAD. (CAN BE ROTATED 180° FROM POSITION SHOWN) —



 **INDICATOR LIGHTS**  
(ADD .25 TO VALVE HEIGHT)



**SINGLE SOLENOID, SPRING OFFSET TYPE**

DGFS4-04\*\*A\*\*.\*.\*.\*-A\*

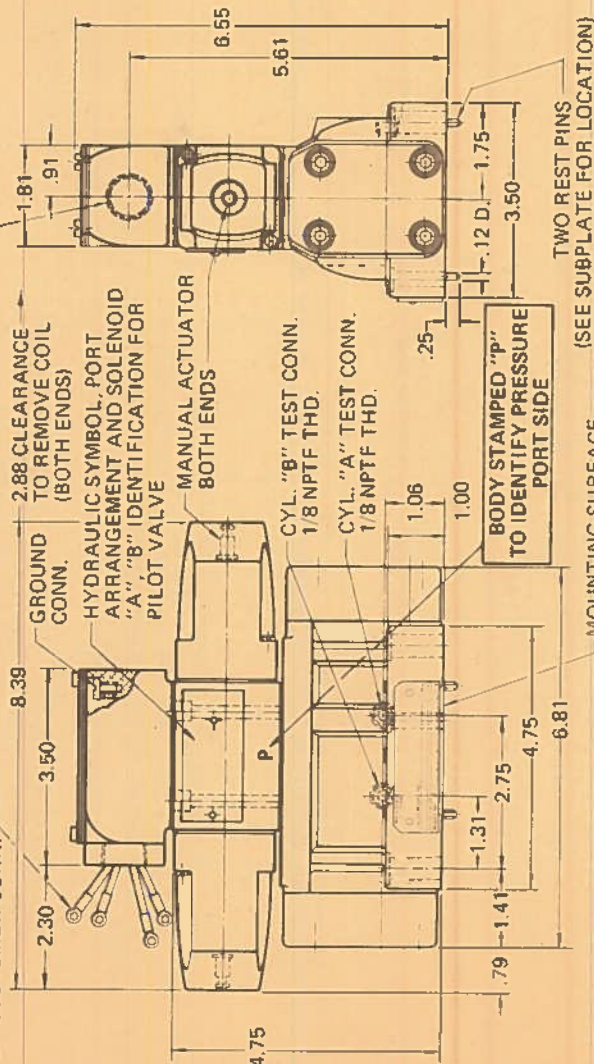
WEIGHT 1 BS (APPROX) - 140

(WHEN COIL IS DE-ENERGIZED, THE MAIN SPOOL IS RETURNED TO THE OFFSET POSITION BY PILOT PRESSURE. THERE IS NO SPRING IN THE MAIN STAGE.)

SINGLE FSOI ENOID SPRING CENTERED

06584M\*B\*\*\*.4\*

(WHEN COIL IS DE-ENERGIZED, SPOOL IS RETURNED TO THE SPRING CENTERED POSITION - RIGHT HAND POSITION SHOWN)



TWO REST PINS  
(SEE SUBPLATE FOR LOCATION)

MOUNTING SURFACE  
(SEALS FURNISHED)

DOUBLE SOLENOID, SPRING CENTERED &amp; NO-SPRING DETENTED TYPES

DG5S4-04 \* C \* . \* . \* . 4 \* DG5S4-04 \* N \* . \* . \* . 4 \*

WEIGHT LBS. (APPROX.) - 15.0

REVISÉ 12 1-78

517810

## DIRECTIONAL CONTROLS

**TO 60 GPM  
& 3000 PSI**

**FOR 1/2" OR  
3/4" PIPING**

**SPRING CENTERED  
SPRING OFFSET &  
NO-SPRING DETENTED  
MODELS**

MANIFOLD OR  
SUBPLATE  
MOUNTING

DWG. NO.  
517810



# SPERRY VICKERS<sup>TM</sup> CHECK VALVE

MODEL SERIES CSG-815  
MANIFOLD MOUNTING FOR 3/4" PIPING

## GENERAL DATA

FOR USE IN OIL HYDRAULIC CIRCUITS WHERE A SPRING CLOSED CHECK VALVE IS REQUIRED TO ALLOW FLOW IN ONE DIRECTION (SEE ARROW) AND TO PREVENT FLOW IN OPPOSITE DIRECTION. INTERNAL PARTS ARE OF HARDENED AND GROUND ALLOY STEEL AS REQUIRED FOR CONTINUOUS HIGH PRESSURE HYDRAULIC SERVICE.

RECOMMENDED WHERE A VALVE IS REQUIRED TO CHECK A HIGH VELOCITY REVERSE FLOW OF FLUID.

MAXIMUM OPERATING PRESSURE RECOMMENDED..... 3000 PSI

NOMINAL FLOW CAPACITY..... 20 GPM  
SEE PRESSURE DROP INFORMATION AT RIGHT.

## CRACKING PRESSURES

MODEL NUMBER	CRACKING PRESSURE PSI
CSG-815	5
CSG-815-S3	50
CSG-815-S8	75

MOUNTING POSITION OF VALVE IS NOT LIMITED BECAUSE OF SPRING CLOSURE CONSTRUCTION.

WEIGHT LBS. (APPROX.)..... 6.5

## PRESSURE DROP INFORMATION

PRESSURE DROP FOR FREE FLOW ACROSS CHECK VALVE	
VOLUME (GPM)	PSI
10	7
20	15
30	25
40	36

1. THE FIGURES IN THE PRESSURE DROP CHART GIVE APPROXIMATE PRESSURE DROPS ( $\Delta P$ ) WHEN PASSING FLOW OF 100 SSU FLUID(S), HAVING .865 SPECIFIC GRAVITY.

2. FOR ANY OTHER VISCOSITY(S) THE PRESSURE DROP ( $\Delta P_1$ ) WILL CHANGE AS FOLLOWS:

OTHER VISCOSITY(S)	75	150	200	250	300	350	400
% OF ( $\Delta P$ ) FROM TABLE (APPROXIMATE)	93	111	119	126	132	137	141

3. FOR ANY OTHER SPECIFIC GRAVITY ( $G_1$ )\* THE PRESSURE DROPS ( $\Delta P_1$ ) WILL BE APPROXIMATELY:  $\Delta P_1 = \Delta P (G_1/G)$ .

\*SPECIFIC GRAVITY OF FLUID MAY BE OBTAINED FROM ITS PRODUCER. FOR FIRE RESISTANT FLUIDS, THE VALUE IS HIGHER THAN FOR OIL.



# **SPIERREY VICKERS** <sup>TM</sup> **CHECK VALVE**

MODEL SERIES CSG-815  
MANIFOLD MOUNTING FOR 3/4" PIPING

SPIERREY VICKERS  
TROY, MICHIGAN 48064

DIRECTIONAL  
CONTROLS

CHECK  
VALVE

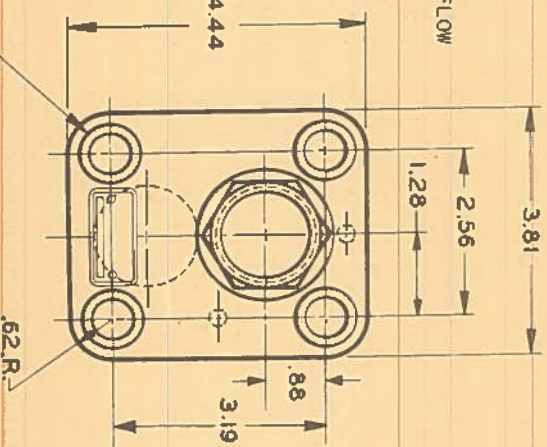
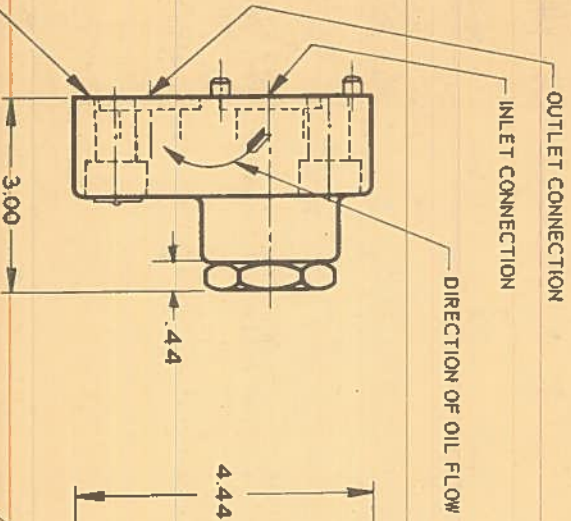
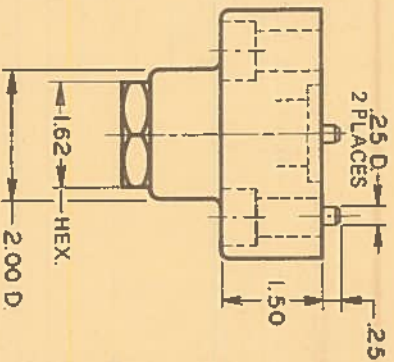
POCKET  
TYPE

FOR  
3/4" PIPING

MANIFOLD  
MOUNTING

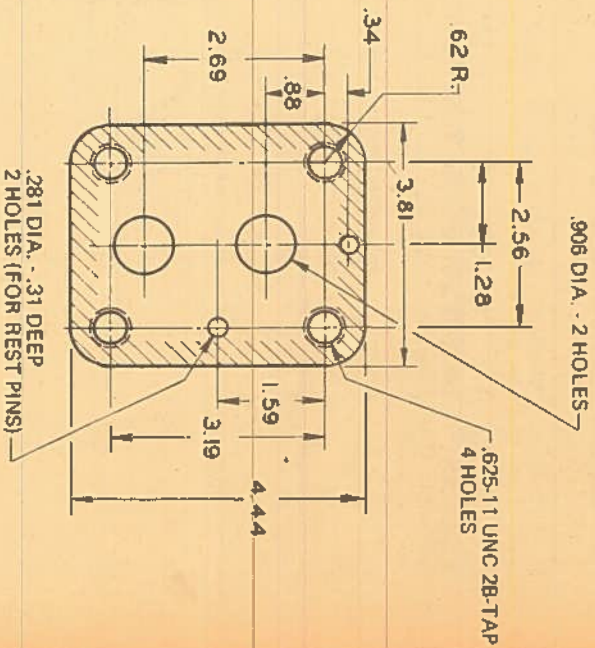
DWG. NO.  
518500A

MOUNTING BOLT KITS  
MOUNTING BOLTS MUST BE ORDERED SEPA-  
RATELY:  
EXAMPLE: ONE (1) CSG-815 VALVE  
ONE (1) BKG815.612 MOUNTING  
BOLT KIT



## **MOUNTING PAD**

A MACHINED PAD (AS INDICATED BY SHADED AREA) MUST  
BE PROVIDED FOR MOUNTING; PAD MUST BE FLAT WITHIN  
.0005 INCH AND SMOOTH WITHIN 63 MICROINCH. MOUNTING  
BOLTS, WHEN PROVIDED BY CUSTOMER, SHOULD BE SAE  
GRADE 7, OR BETTER.



MOUNTING SURFACE  
(SEALING RINGS FURNISHED)

REVISED 3-1-74

518500A



**SPERRY VICKERS**  
TROY, MICHIGAN 48064

STANDARD GRAPHICAL SYMBOL  
FOR FLUID POWER DIAGRAM



**SPERRY VICKERS**  
POWER AND MOTION  
CONTROL SYSTEMS

**C5G-805  
CHECK VALVE**

10 GPM AND 3600 PSI  
STEEL POPPET AND SEAT TYPE  
MANIFOLD MOUNTING

MAXIMUM OPERATING PRESSURE.....3600 PSI  
NOMINAL FLOW CAPACITY.....10 GPM  
MOUNTING POSITION OF VALVE IS NOT LIMITED. RECOMMENDED WHERE A  
VALVE IS REQUIRED TO CHECK A HIGH VELOCITY REVERSE FLOW OF FLUID.

**GENERAL USAGE**

IN OIL HYDRAULIC CIRCUITS WHERE A SPRING CLOSED CHECK VALVE IS  
REQUIRED TO ALLOW FLOW IN ONE DIRECTION AND PREVENT FLOW IN THE  
OPPOSITE DIRECTION. DESIGNED FOR CONTINUOUS HIGH PRESSURE SERVICE.

DIRECTIONAL  
CONTROLS

CHECK  
VALVE

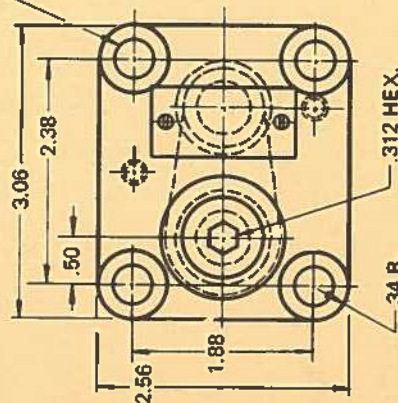
POPPET  
TYPE

FOR 3/8" PIPE OR  
1/2" O.D. TUBING

MANIFOLD  
MOUNTING

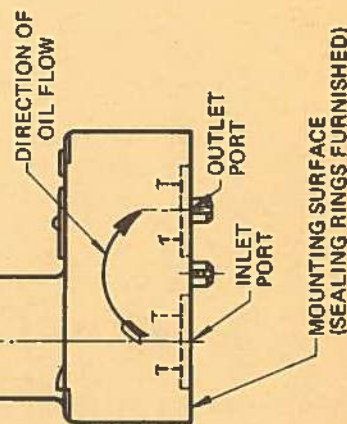
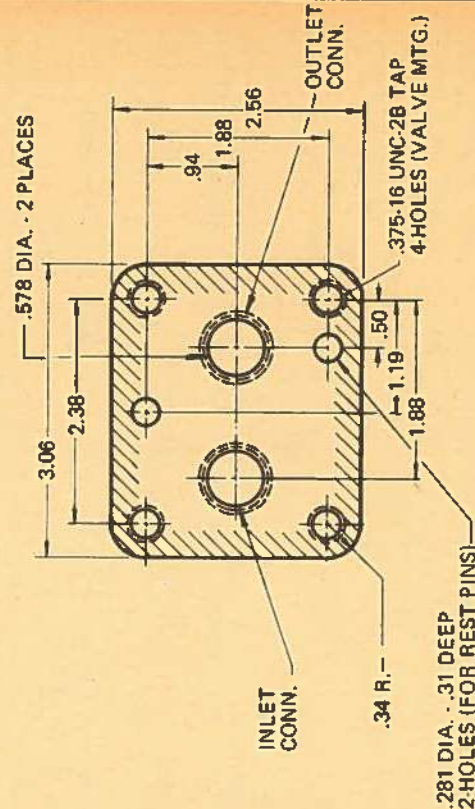
DWG. NO.  
518450

.422 DIA. THRU .69 D. SPOTFACE  
4 HOLES FOR MOUNTING



CHECK VALVE MODEL NO.	CRACKING PRESS. (PSI)
C5G-805	5
C5G-805-S3	50
C5G-805-S8	75

**MOUNTING PAD**



A MACHINED PAD (AS INDICATED BY SHADED AREA) MUST BE PROVIDED FOR  
MOUNTING; PAD MUST BE FLAT WITHIN .0005 INCH AND SMOOTH WITHIN 63  
MICROINCH. MOUNTING BOLTS, WHEN PROVIDED BY CUSTOMER, SHOULD BE  
SAE GRADE 7, OR BETTER.

MOUNTING BOLT KITS  
MOUNTING BOLTS MUST BE ORDERED SEPARATELY:  
EXAMPLE: ONE (1) C5G-805 VALVE  
ONE (1) BKG805-619 BOLT KIT

MAXIMUM RECOMMENDED MOUNTING BOLT TORQUE.....315 LB. IN.

REVISED 3-1-74

518450



RECOMMENDED WHERE A VALVE IS REQUIRED TO CHECK A HIGH VELOCITY REVERSE FLOW OF FLUID.

MAXIMUM OPERATING PRESSURE RECOMMENDED..... 3600 PSI

NOMINAL FLOW..... 10 GPM

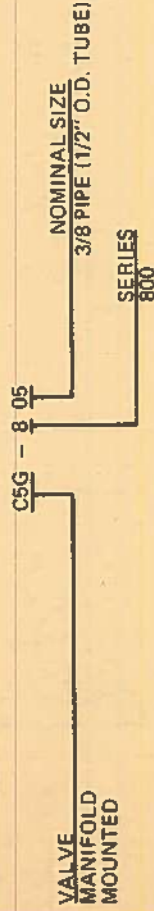
FLUIDS AND SEALS  
REFER TO DATA SHEET I-286-S (SECTION I) FOR HYDRAULIC OIL RECOMMENDATIONS. THE USE OF SYNTHETIC, FIRE RESISTANT FLUIDS REQUIRE A VALVE WITH SPECIAL SEALS. ADD PREFIX "F3" TO MODEL NUMBER WHEN PHOSPHATE ESTERS TYPE FLUIDS OR BLENDS ARE TO BE USED. WATER GLYCOL, WATER-IN-OIL EMULSIONS AND PETROLEUM OIL FLUIDS MAY BE USED WITH STANDARD SEALS.

FILTRATION..... 25 MICRON

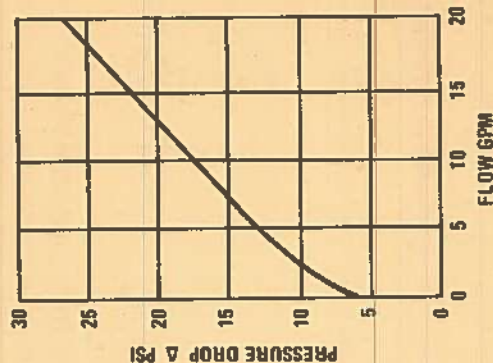
MOUNTING POSITION OF VALVE IS NOT LIMITED BECAUSE OF SPRING CLOSURE CONSTRUCTION.

WEIGHT LBS. (APPROX.)..... 2.7

MODEL CODE



C5G-805



1. THE FIGURES IN THE PRESSURE DROP CHART GIVE APPROXIMATE PRESSURE DROPS (ΔP) WHEN PASSING FLOW OF 100 SSU FLUID(S), HAVING .866 SPECIFIC GRAVITY.
2. FOR ANY OTHER VISCOSITY(S) THE PRESSURE DROP (ΔP<sub>1</sub>) WILL CHANGE AS FOLLOWS:

OTHER VISCOSITY(S)	75	150	200	250	300	350	400
% OF (ΔP) FROM TABLE (APPROXIMATE)	93	111	119	126	132	137	141

3. FOR ANY OTHER SPECIFIC GRAVITY (G<sub>1</sub>)\* THE PRESSURE DROPS (ΔP<sub>1</sub>) WILL BE APPROXIMATELY: ΔP<sub>1</sub> = ΔP (G<sub>1</sub>/G).

\*SPECIFIC GRAVITY OF FLUID MAY BE OBTAINED FROM ITS PRODUCER. FOR FIRE RESISTANT FLUIDS, THE VALUE IS HIGHER THAN FOR OIL.



**SPERRY VICKERS**  
TROY, MICHIGAN 48084

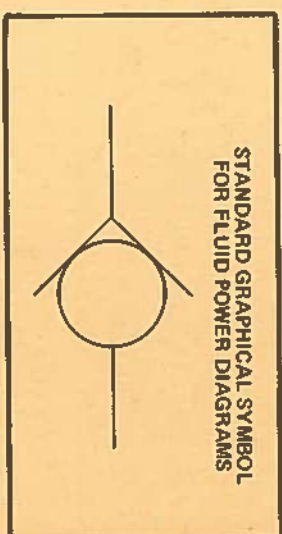
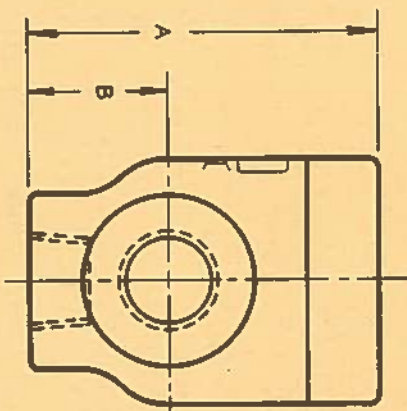
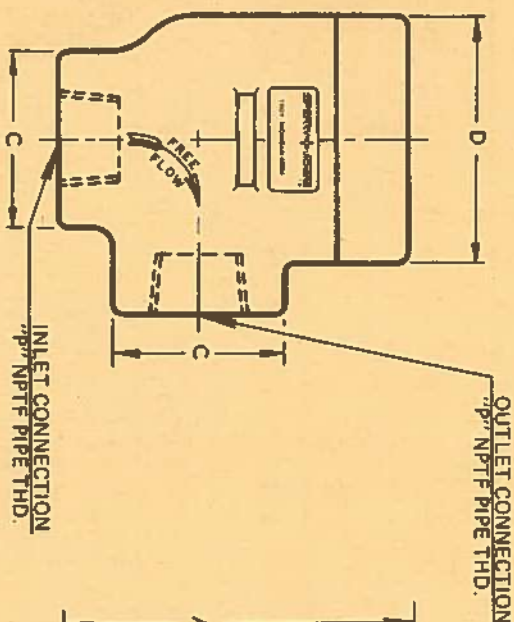
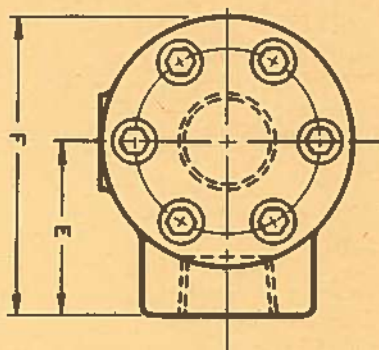
## DIRECTIONAL CONTROLS

## CHECK VALVES

RIGHT ANGLE  
TYPE

PIPE SIZES  
1/4" TO 2"

THREADED CONNECTIONS

DWG. NO.  
518400

**GENERAL DATA**

FOR USE IN OIL HYDRAULIC CIRCUITS WHERE A SPRING CLOSED CHECK VALVE IS REQUIRED TO ALLOW FLOW IN ONE DIRECTION (SEE ARROW) AND TO PREVENT FLOW IN OPPOSITE DIRECTION. INTERNAL PARTS ARE OF HARDENED AND GROUND ALLOY STEEL AS REQUIRED FOR CONTINUOUS HIGH PRESSURE HYDRAULIC SERVICE.

RECOMMENDED WHERE A VALVE IS REQUIRED TO CHECK A HIGH VELOCITY REVERSE FLOW OF FLUID.

MAXIMUM OPERATING PRESSURE..... 3000 PSI

NOMINAL FLOW CAPACITY AND PRESSURE DROP..... SEE CHART

MOUNTING POSITION OF VALVE IS NOT LIMITED BECAUSE OF SPRING CLOSURE CONSTRUCTION.

**SPEERY VICKERS**  
T.M.

**RIGHT ANGLE CHECK VALVES**

**MODEL SERIES C2-8\*\***  
**THREADED CONNECTIONS**

MODEL NUMBER (FOR CRACKING PRESSURE)				"P" PIPE TH'D	NOMINAL FLOW CAPACITY	●PRESSURE DROP PSI (APPROX.) AT RATED FLOW — SAE 10W @ 120° F.	A	B	C	D	E	F	WEIGHT LBS. (APPROX.)
●5	50	75	▲6	IN.	G.P.M.								
C2-800	C2-800-S3	C2-800-S8	C2-800-S12	1/4	3	18	2.94	1.03	1.25	2.12	1.25	2.31	3
C2-805	C2-805-S3	C2-805-S8	C2-805-S12	3/8	6	20	2.94	1.03	1.25	2.12	1.25	2.31	3
C2-815	C2-815-S3	C2-815-S8	C2-815-S12	3/4	16	20	3.88	1.75	2.00	2.75	1.81	3.19	5
C2-820	C2-820-S3	C2-820-S8	C2-820-S12	1	28	14	4.56	1.84	2.25	3.25	2.25	3.88	8
C2-825	C2-825-S3	C2-825-S8	C2-825-S12	1-1/4	45	14	5.44	2.62	3.00	3.25	2.62	4.25	10-1/2
C2-830	C2-830-S3	C2-830-S8	C2-830-S12	1-1/2	65	23	5.44	2.62	3.00	3.25	2.62	4.25	10-1/2
C2-835	C2-835-S3	C2-835-S8	C2-835-S12	2	100	20	7.38	2.88	3.50	4.50	3.62	5.88	27

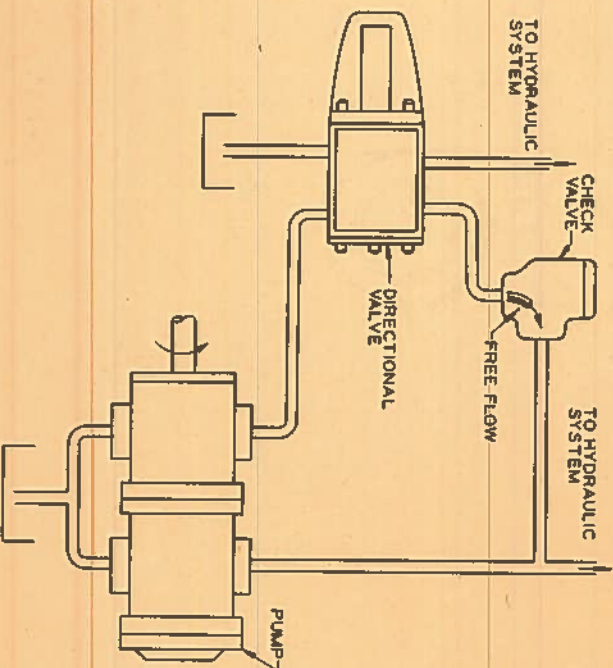
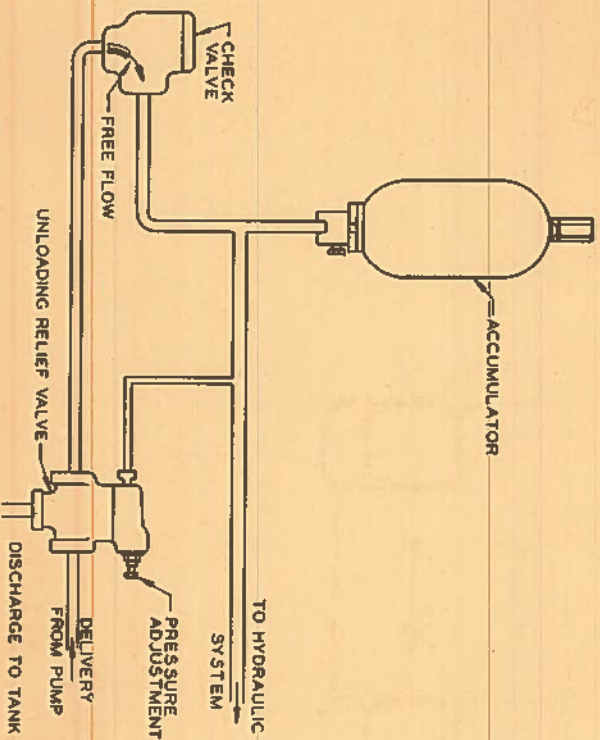
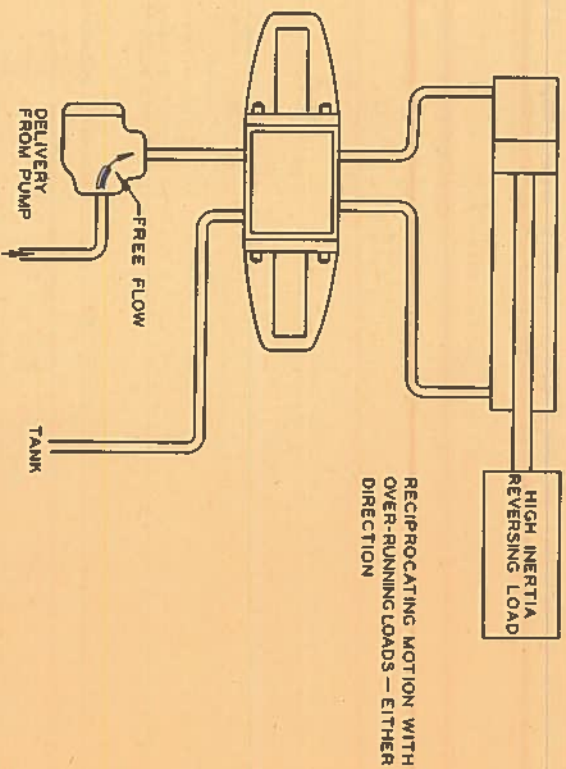
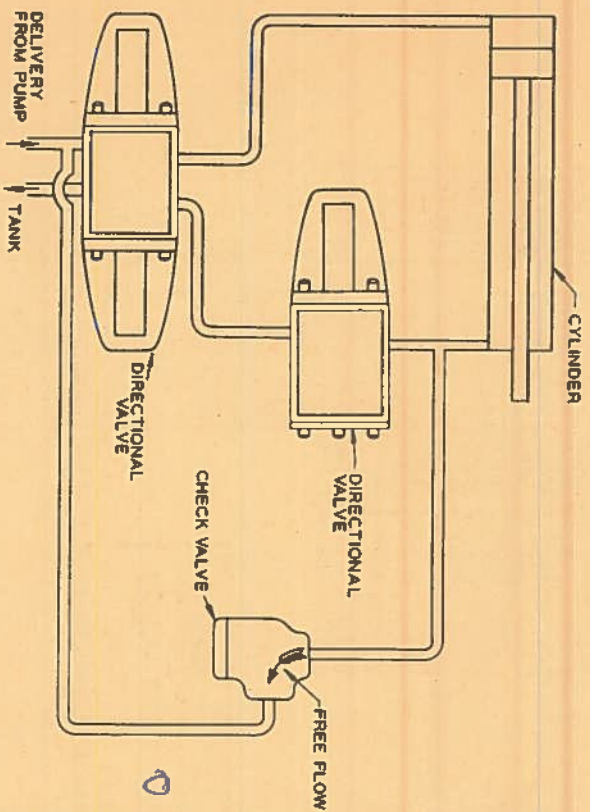
▲MODELS WITH SUFFIX \$12 ARE FITTED WITH AN ORIFICE PLUG, WHICH CAN BE DRILLED TO ALLOW A SUITABLE BLEED WHEN VALVE IS CLOSED.

REVISÉD 4 - 1 - 75

518400



**TYPICAL CHECK VALVE APPLICATIONS  
WHERE THE IN-LINE CHECK VALVE  
MUST NOT BE USED**

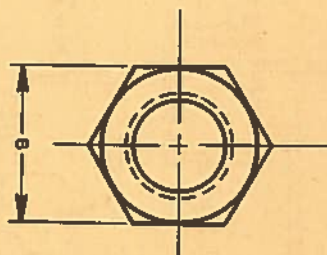
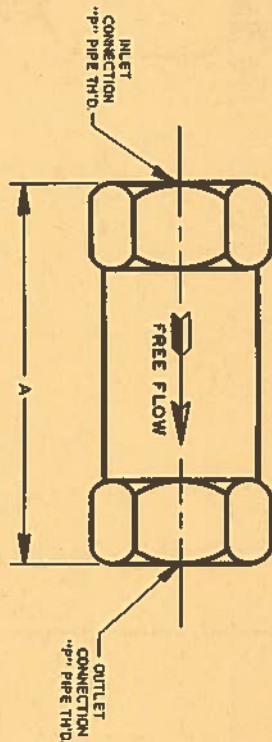




# VICKERS® IN-LINE TYPE CHECK VALVES

## PIPE THREAD CONNECTIONS

### SPRING CLOSED CONSTRUCTION



**CAUTION**  
DO NOT USE THIS VALVE TO CHECK A HIGH VELOCITY REVERSE FLOW RESULTING IN SHOCK CONDITIONS. (SEE REVERSE SIDE OF DRAWING.) WHERE SUCH CONDITIONS EXIST, VICKERS RIGHT ANGLE CHECK VALVE MUST BE USED.

MODEL NUMBER	"P" PIPE THD.	CAPACITY G.P.M.	CRACKING PRESSURE	A	B	WEIGHT (APPROX.) LBS.
DT8P1-02.5	1/4	3.2	5 P.S.I.	2.25	.68	1/2
DT8P1-02.30			30 P.S.I.			
DT8P1-02.65			65 P.S.I.			
DT8P1-03.5	3/8	8	5 P.S.I.	3.00	1.00	3/4
DT8P1-03.30			30 P.S.I.			
DT8P1-03.65			65 P.S.I.			
DT8P1-06.5	3/4	20	5 P.S.I.	3.68	1.50	1 1/2
DT8P1-06.30			30 P.S.I.			
DT8P1-06.65			65 P.S.I.			
DT8P1-10.5	1 1/4	30	5 P.S.I.	5.25	2.50	6
DT8P1-10.30			30 P.S.I.			
DT8P1-10.65			65 P.S.I.			

**GENERAL USAGE**  
FOR USE IN FLUID POWER SYSTEMS USING PETROLEUM OR FIRE RESISTANT FLUIDS. RATED CAPACITY BASED ON USING HYDRAULIC OIL HAVING A VISCOSITY RATING OF 150 S.S.U. @ 100°F.  
**OPERATING PRESSURE** ..... MAX. RECOMMENDED 3000 P.S.I.  
**CRACKING PRESSURE** AS TABULATED INDICATES PRESSURE REQUIRED TO OPEN VALVE AND ALLOW FREE FLOW.  
**MODEL NUMBER** MUST BE SPECIFIED COMPLETE WHEN ORDERING TO INSURE CORRECT SIZE AND CRACKING PRESSURE REQUIRED.



## INSTA-PLUG FEATURES

THE INSTA-PLUG CONSISTS OF THE FOLLOWING FEATURES:

1. SECTION "A", A FOUR-PRONGED SELF-ALIGNING ELECTRICAL PLUG SECURED IN A HOUSING THAT IS MOUNTED ON TOP CENTER OF THE VALVE BODY WHERE THE SOLENOID LEADS TERMINATE; OR:

2. A "B" COMPLETE INSTA-PLUG ASSEMBLY THAT INCLUDES THE "A" HOUSING ON TOP OF WHICH RESTS A SIMILAR HOUSING CONTAINING THE MATING RECEPTACLE. THE TWO HOUSINGS ARE KEYED TO ASSURE PROPER HOOK-UPS.

THE TOP HOUSING IS REMOVED FROM THE LOWER ("A") HOUSING TO BREAK THE ELECTRICAL CONNECTIONS TO THE VALVE SOLENOIDS OR PRESSED ONTO THE "A" HOUSING TO COMPLETE THE CIRCUIT. THE ASSEMBLY IS HELD TOGETHER BY TWO SLOTTED THUMB SCREWS.

A NAMEPLATE AND SOLENOID INDICATOR LIGHTS ARE PART OF THE RECEPTACLE WHEN SPECIFIED.

CONNECTIONS TO THE ELECTRIC POWER ARE MADE THROUGH THE END OF THE RECEPTACLE HOUSING AND CAN BE PREWIRED BY THE CUSTOMER. END LOCATION OF ELECTRICAL CONDUIT PORT PERMITS SPACE-SAVING SIDE-BY-SIDE VALVE MOUNTING.

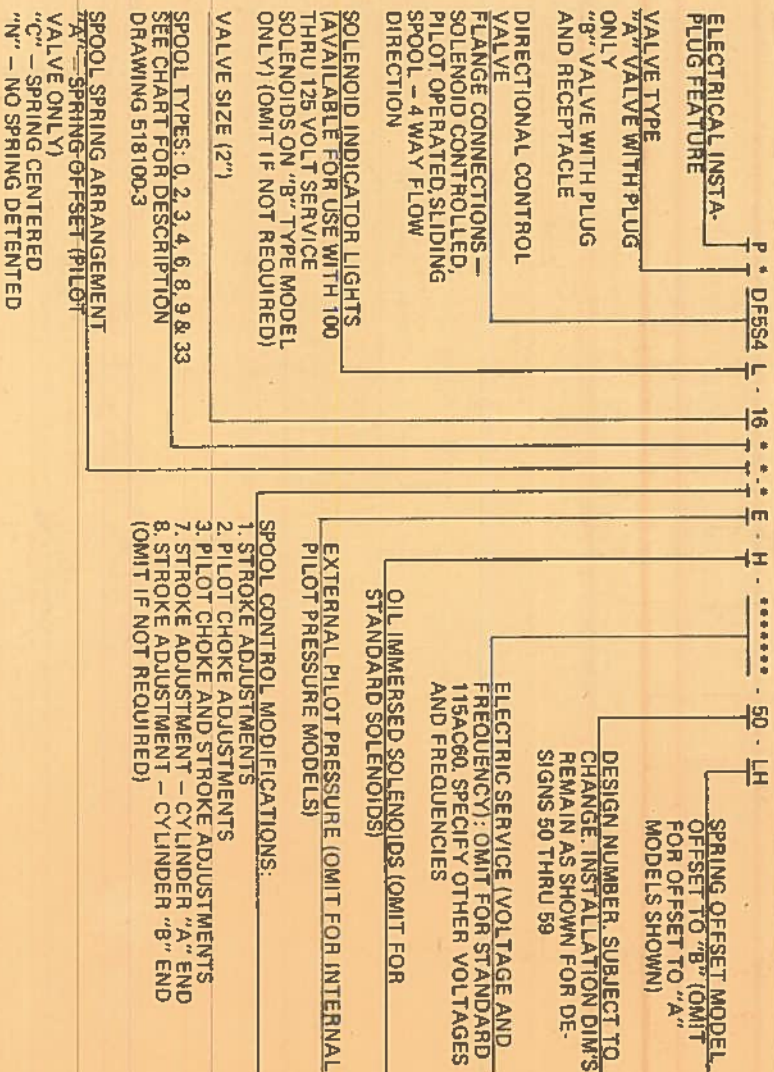
WIRE LEADS APPROXIMATELY 7" LONG ARE PROVIDED WHEN NO LIGHTS ARE SPECIFIED. MODELS WITH LIGHTS HAVE TERMINALS INSIDE THE RECEPTACLE HOUSING.

AFTER INITIAL INSTALLATION, ELECTRICAL AND HYDRAULIC CONNECTIONS NEED NOT BE DISTURBED WHEN VALVE WITH INSTA-PLUG IS REMOVED.

### NOTE

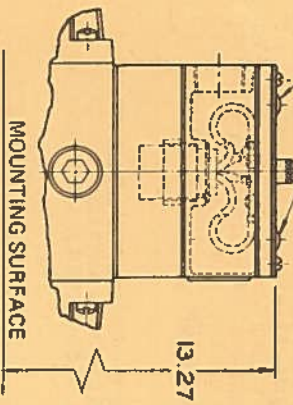
SOLENOIDS "A" AND "B" ARE IDENTIFIED ON THE PLUG-IN AND RECEPTACLE HOUSINGS. THEY CORRESPOND WITH SOLENOID IDENTIFICATION PLATE. IN CASE OF TANDEM VALVES (NO. 4 AND 8 SPOOLS), THE INSTA-PLUG IS ROTATED 180° AND CONDUIT CONNECTION IS ON THE OPPOSITE END THAN THAT SHOWN.

WEIGHT (APPROX.) INSTA-PLUG ONLY..... 1.0 LB.

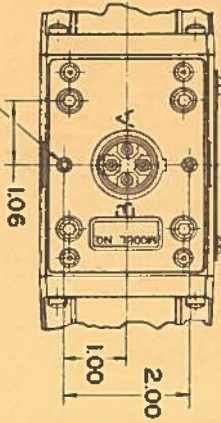




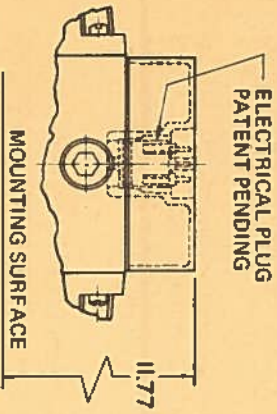
SOLENOID INDICATOR LIGHTS  
(ON SPRING OFFSET UNITS LIGHT  
IS ON SOLENOID END ONLY)



MODEL PBD554L-16\*\*50  
WITH INSTA-PLUG FEATURE AND  
SOLENOID INDICATOR LIGHTS

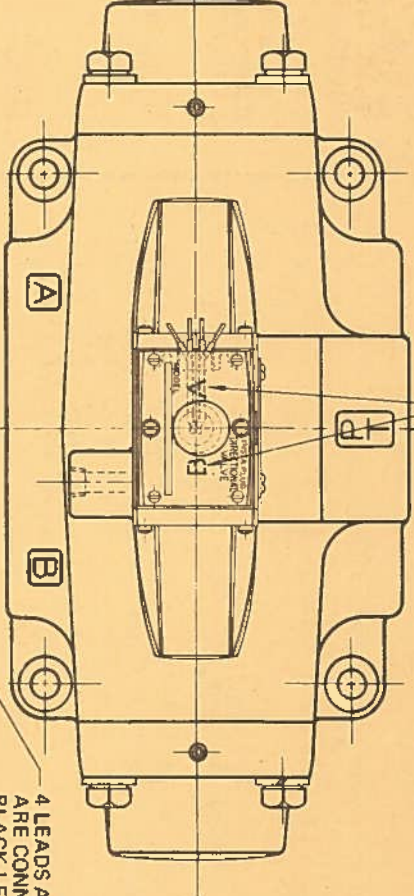


8-32 U.N.C. 28 THD. .56 DEEP  
2 HOLES FOR MOUNTING  
RECEPTACLE BOX



MODEL PAD554-16\*\*50  
WITH PLUG SECTION ONLY

SOLENOIDS "A" AND "B" ARE IDENTIFIED ON THE PLUG  
AND RECEPTACLE CASTINGS AND CORRESPOND WITH  
SOLENOID IDENTIFICATION PLATE.



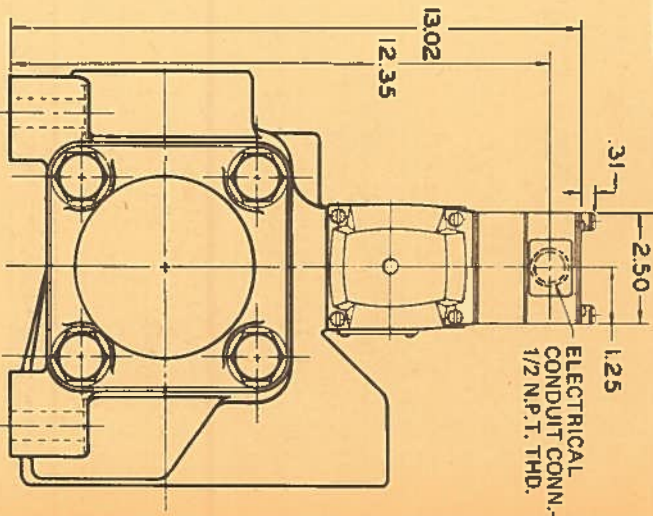
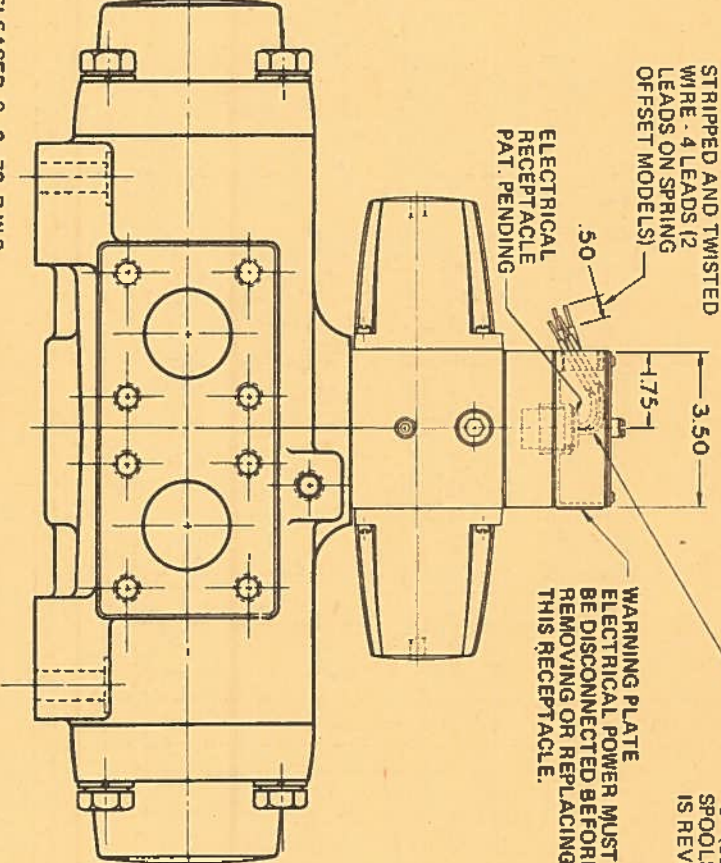
STRIPPED AND TWISTED  
WIRE - 4 LEADS (2  
LEADS ON SPRING  
OFFSET MODELS)

ELECTRICAL  
RECEPTACLE  
PAT. PENDING

WARNING PLATE  
ELECTRICAL POWER MUST  
BE DISCONNECTED BEFORE  
REMOVING OR REPLACING  
THIS RECEPTACLE.

4 LEADS APPROX. 7.00 LONG. WHITE LEADS  
ARE CONNECTED TO SOLENOID "A" AND  
BLACK LEADS ARE CONNECTED TO SOLENOID  
"B" (SEE DIAGRAM PLATE). FOR TYPE 4 AND 8  
SPOOLS CONDUIT CONNECTION LOCATION  
IS REVERSED.

MODEL PBD554-16\*\*50  
WITH INSTA-PLUG FEATURE (WITHOUT  
SOLENOID INDICATOR LIGHTS)



ELECTRICAL  
CONDUIT CONN.  
1/2 N.P.T. THD.

RELEASED 3-2-70 R.W.S.

518100-6

**VICKERS** INSTA-PLUG  
FOR SERIES DF554-16

DOUBLE SOLENOID NO-SPRING DETENTED,  
SPRING CENTERED, AND SPRING OFFSET MODELS



## MOUNTING POSITION

NO-SPRING DETENTED MODELS MUST BE INSTALLED WITH THE LONGITUDINAL AXIS HORIZONTAL FOR GOOD MACHINE RELIABILITY. MOUNTING POSITION OF SPRING OFFSET AND SPRING CENTERED MODELS IS UNRESTRICTED PROVIDED THAT THE PILOT PRESSURE SUPPLY IS MAINTAINED AS REQUIRED. (SPRING OFF-SET VALVES DO NOT HAVE A SPRING IN THE MAIN SPOOL SECTION.)

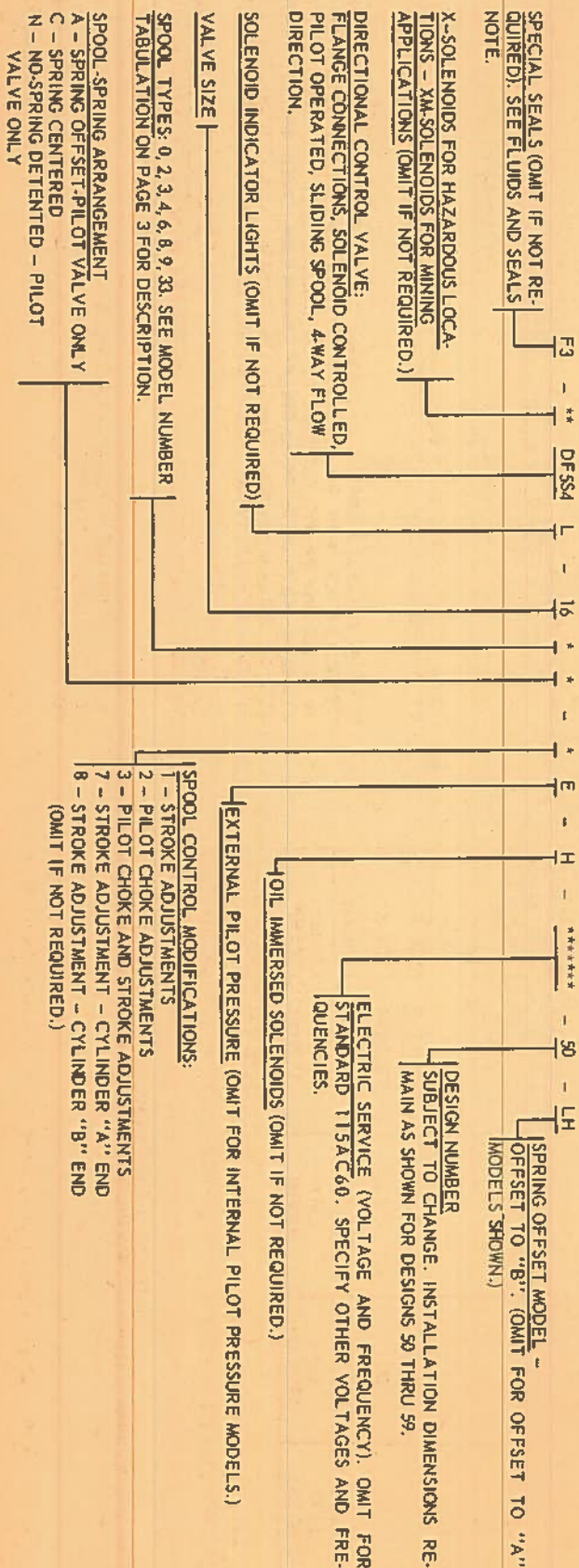
NOTE: SURGES OF OIL IN A COMMON PILOT VALVE DRAIN LINE, SERVING THESE AND OTHER VALVES, CAN BE OF SUFFICIENT MAGNITUDE TO CAUSE INADVERTENT SHIFTING OF THESE VALVES. THIS IS PARTICULARLY CRITICAL IN THE NO-SPRING DETENTED TYPE VALVES. SEPARATE DRAIN LINES OR A VENTED DRAIN MANIFOLD WITH A CONTINUOUS DOWNWARD PATH TO TANK IS NECESSARY.

## OPTIONAL FEATURES

FLUIDS AND SEALS: THE USE OF SYNTHETIC, FIRE-RESISTANT FLUIDS REQUIRES A VALVE WITH SPECIAL SEALS. ADD PREFIX "F3" TO MODEL NUMBER WHEN PHOSPHATE ESTERS OR CHLORINATED HYDROCARBONS ARE TO BE USED. WATER GLYCOL, WATER-IN-OIL EMULSION AND PETROLEUM OIL FLUIDS MAY BE USED WITH STANDARD SEALS.

SOLENOID INDICATOR LIGHTS: LIGHTS ARE "ON" WHEN THERE IS CURRENT AT THE SOLENOIDS. ON SPRING OFFSET MODELS, LIGHT IS ON SOLENOID END ONLY. LIGHTS ARE AVAILABLE FOR USE WITH 100 THRU 125 VOLT SERVICE SOLENOIDS ONLY. NOT AVAILABLE FOR HAZARDOUS DUTY TYPE MODELS.

## MODEL CODE





# DESCRIPTION

THESE VALVES ARE GENERALLY USED TO CONTROL THE DIRECTION OF FLOW IN A HYDRAULIC CIRCUIT. THIS, IN TURN, WOULD CONTROL THE DIRECTION OF MOVEMENT OF A WORK CYLINDER, OR THE ROTATION OF A FLUID MOTOR.

## SYSTEM PRESSURE AND FLOW

MAXIMUM OPERATING PRESSURE (SEE BELOW) ..... 3000 PSI  
MAXIMUM TANK LINE PRESSURE ..... 3000 PSI

**PILOT PRESSURE:** THE PILOT PRESSURE SOURCE IN MODELS TABULATED IS CONNECTED INTERNALLY WITH PRESSURE INLET CONNECTION AND IS EQUAL TO PRESSURE AT PRESSURE PORT. WITH MODELS HAVING PRESSURE OPEN OR PARTIALLY OPEN TO TANK AT CENTER POSITION, PILOT PRESSURE CAN BE ASSURED BY IMPOSING A BACK PRESSURE OF AT LEAST 65 PSI AT THE TANK OUTLET CONNECTION (THIS BACK PRESSURE WILL BE PRESENT AT CYLINDER PORTS IF SPOOL IS "O" OR "9" TYPE).

WHEN PILOT PRESSURE FROM SEPARATE SOURCE (EXTERNAL) IS REQUIRED AN EXTERNAL CONNECTION CAN BE PROVIDED. ORDER ACCORDING TO MODEL CODE.

## RECOMMENDED FLOW AT 3000 PSI

..... 200 GPM

## MAXIMUM FLOW AND PRESSURE WITHOUT MALFUNCTION

NO SPRING DETENTED AND SPRING OFFSET MODELS ..... 350 GPM @ 3000 PSI  
SPRING CENTERED MODELS - TYPE 9 SPOOL ..... 350 GPM @ 3000 PSI  
- OTHER SPOOLS ..... 350 GPM @ 3000 PSI

## FILTRATION RECOMMENDED

..... 25 MICRON

## PSI PRESSURE DROP CHART

FLOW PATH					
SPOOL TYPE	P TO A	B TO T	P TO B	A TO T	CENTERED P TO T
0	11	22	11	24	24
2	16	41	16	42	
3	18	43	16	23	52
4	23	59	75	33	66
6	16	20	16	23	
8	23	57	75	33	61
9	13	26	13	29	
33	16	41	16	42	

1. FIGURES IN PRESSURE DROP CHART GIVE APPROXIMATE PRESSURE DROPS ( $\Delta P$ ) WHEN PASSING 200 GPM FLOW (Q) OF 100 SUS FLUID(S) HAVING .865 SPECIFIC GRAVITY.

2. FOR ANY OTHER FLOW RATE ( $Q_1$ ), THE PRESSURE DROP ( $\Delta P_1$ ) WILL BE APPROXIMATELY:

$$\Delta P_1 = \Delta P (Q_1 / Q)^2$$

3. FOR ANY OTHER VISCOSITY(S), THE PRESSURE DROP ( $\Delta P$ ) WILL CHANGE AS FOLLOWS:

OTHER VISCOSITY(S)	75	150	200	250	300	350	400
% OF ( $\Delta P$ ) (APPROX.)	93	111	119	126	132	137	141

4. FOR ANY OTHER SPECIFIC GRAVITY ( $G_1$ ), \*THE PRESSURE DROP ( $\Delta P_1$ ) WILL BE APPROXIMATELY:

$$\Delta P_1 = \Delta P (G_1 / G)$$

\*SPECIFIC GRAVITY OF FLUID MAY BE OBTAINED FROM ITS PRODUCER. THE VALUE IS HIGHER FOR FIRE-RESISTANT FLUIDS THAN FOR OIL

## SOLENOIDS

ELECTRIC SERVICE: SOLENOIDS ON MODELS LISTED ARE FOR 115 VOLT - 60 CYCLE SERVICE. SPECIFY IN MODEL NUMBER IF OTHER THAN 115 VOLT - 60 CYCLE SERVICE IS DESIRED. SEE MODEL CODE.

SOLENOID CURRENT APPROX. MAXIMUM	INRUSH AMPS	HOLDING AMPS	HOLDING WATTS
115 VOLT - 60 CYCLE	4.50	.64	
230 VOLT - 60 CYCLE	2.25	.32	
460 VOLT - 60 CYCLE	1.13	.16	
6 VOLT - DC			24
12 VOLT - DC			24
24 VOLT - DC			24

## SHIFTING ACTION

SPRING CENTERED AND SPRING OFFSET MODELS MUST BE ENERGIZED CONTINUOUSLY. DETENTED NO SPRING MODELS MAY BE ENERGIZED MOMENTARILY, APPROXIMATELY 0.1 SECOND. SPRING CENTERED MODELS RETURN VALVE SPOOL TO CENTER POSITION WHEN BOTH SOLENOIDS ARE DE-ENERGIZED. SPRING OFFSET MODELS RETURN SPOOL TO OFFSET POSITION BY PILOT PRESSURE WHEN SOLENOID IS DE-ENERGIZED.

WHEN NO SPRING DETENTED MODELS ARE DE-ENERGIZED, THE PILOT AND MAIN SPOOLS REMAIN IN THE LAST POSITION ATTAINED, PROVIDED THERE IS NO SHOCK, VIBRATION, UNUSUAL PRESSURE TRANSIENTS AND THE SPOOL AXIS IS HORIZONTAL. IF PILOT PRESSURE FAILS OR FALLS BELOW THE MINIMUM, THE MAIN SPOOL WILL SPRING CENTER (AT SPRING CENTERED FLOW RATES) AND CANNOT DRIFT TO REVERSAL OF FLOW (PILOT STAGE REMAINS IN DETENTED POSITION). CAUTION: BECAUSE OF THIS, THE FLOW CONDITIONS OF THE SPRING CENTERED POSITION MUST BE SELECTED WITH CARE, BOTH FOR THE EFFECT ON THE DIRECTION OF THE FLOW AND THE PILOT PRESSURE. (THE "9" MAIN SPOOL WILL NOT INSURE SUFFICIENT PILOT PRESSURE IN THE CENTER POSITION.)

NOTE: ANY SLIDING SPOOL VALVE, IF HELD SHIFTED UNDER PRESSURE FOR LONG PERIODS OF TIME, MAY STICK AND NOT SPRING RETURN DUE TO FLUID RESIDUE FORMATION AND, THEREFORE, SHOULD BE CYCLED PERIODICALLY TO PREVENT THIS FROM HAPPENING.

WHEN USED AS OTHER THAN A NORMAL 4-WAY VALVE, CONSULT YOUR VICKERS REPRESENTATIVE.



MODEL NUMBER			SPOOL TYPE	DIRECTION OF OIL FLOW FOR VALVE SPOOL POSITIONS		
DOUBLE SOLENOID NO-SPRING DETENTED	SPRING CENTERED	SINGLE SOLENOID SPRING OFFSET		CENTER APPLIES TO: 1. SPRING CENTERED MODELS DE-ENERGIZED. 2. ALL OTHER MODELS AT CENTER CROSS OVER.	SEE NOTE "4" SOLENOID "A" IS ENERGIZED OR WHEN SPRING OFFSET	SEE NOTE "4" SOLENOID "B" IS ENERGIZED
DFSS4-160N-50	DFSS4-160C-50	DFSS4-160A-50	"0"-OPEN CENTER ALL PORTS	PR. CYL. A & CYL. B → TANK		
DFSS4-162N-50	DFSS4-162C-50	DFSS4-162A-50	"2"-CLOSED CENTER ALL PORTS	PR. CYL. A & CYL. B BLOCKED		
	DFSS4-163C-50		"3"-CLOSED CENTER P & B	PR. & CYL. B BLOCKED CYL. A → TANK		
	DFSS4-164C-50		"4"-TANDEM CLOSED CROSS OVER	PR. → TANK CYL. A & CYL. B BLOCKED		
DFSS4-166N-50	DFSS4-166C-50	DFSS4-166A-50	"6"-CLOSED CENTER P ONLY	PR. BLOCKED CYL. A & CYL. B → TANK	PR. → CYL. A CYL. B → TANK	PR. → CYL. B CYL. A → TANK
	DFSS4-168C-50		"8"-TANDEM OPEN CROSS OVER	PR. → TANK CYL. A & CYL. B BLOCKED		
* DFSS4-169N-50	DFSS4-169C-50	DFSS4-169A-50	"9"-OPEN CENTER PARTIAL ALL PORTS	PR. CYL. A & CYL. B → TANK		
	DFSS4-1633C-50		"33"-CLOSED CENTER BLEED A & B	PR. - BLOCKED CYL. A & CYL. B → TANK		

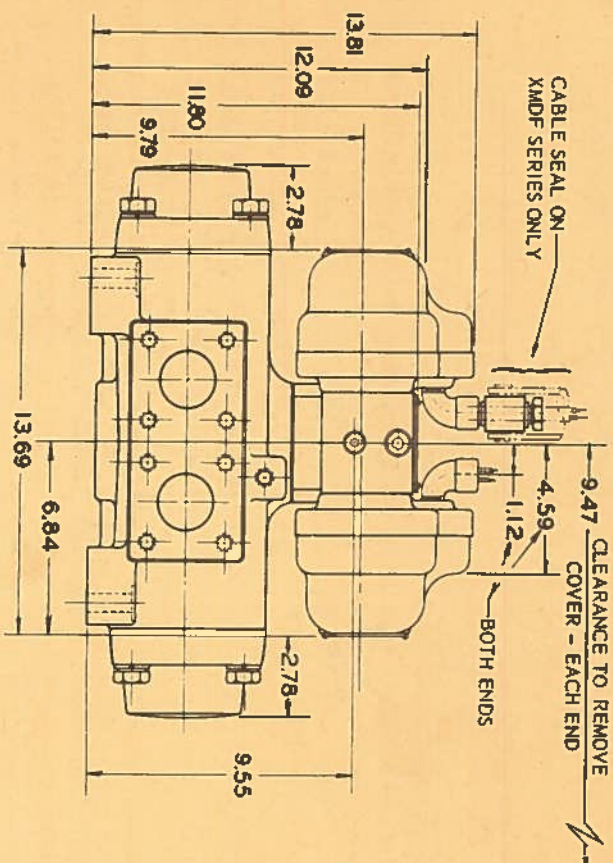
\*SEE PILOT PRESSURE AND SHIFTING ACTION NOTES.

→ FULL FLOW  
X → RESTRICTED FLOW

"4" SOLENOIDS "A" AND "B" ARE IDENTIFIED ON UNIT  
BY DIAGRAM PLATE ON SIDE OF PILOT VALVE.



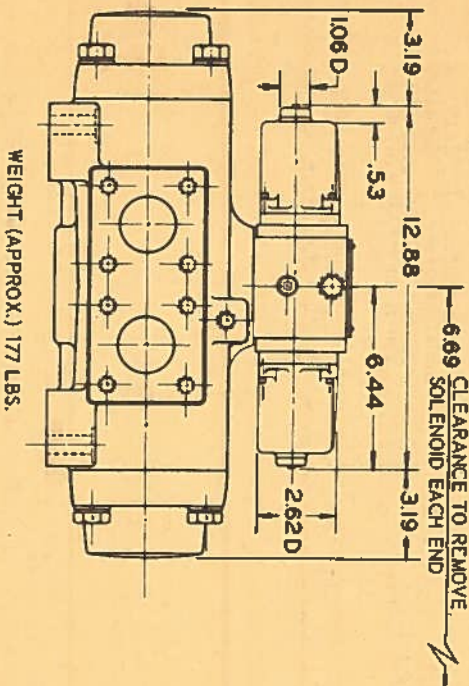
NO SPRING DETENTED AND SPRING CENTERED VALVES FOR HAZARDOUS LOCATIONS AND MINING APPLICATIONS  
(SPRING OFFSET MODELS ALSO AVAILABLE)



VALVES HAVE "UL LISTED" SOLENOIDS FOR USE IN HAZARDOUS LOCATIONS - CLASS I GROUP D, CLASS II GROUP E-F-G, FOR 115 AND 230 V ac, 60 Hz SERVICE.  
VALVES FOR MINING APPLICATIONS ARE BUILT TO MESA SCHEDULE 2G - FILE X/P 837-3. AVAILABLE IN ALL STANDARD VOLTAGES.

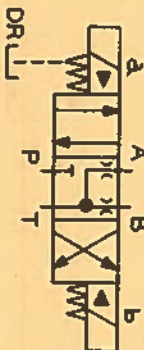
WEIGHT (APPROX.) 180 LBS.

MODELS WITH OIL IMMERSED SOLENOIDS  
NO SPRING DETENTED AND SPRING CENTERED TYPES  
(SPRING OFFSET MODELS ALSO AVAILABLE)

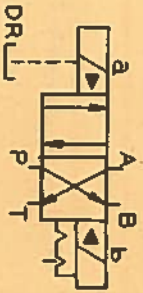


WEIGHT (APPROX.) 177 LBS.

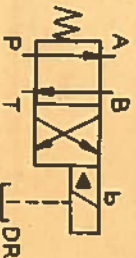
TYPICAL GRAPHICAL SLIDING  
SPOOL SYMBOLS



SPRING CENTERED



NO SPRING DETENTED

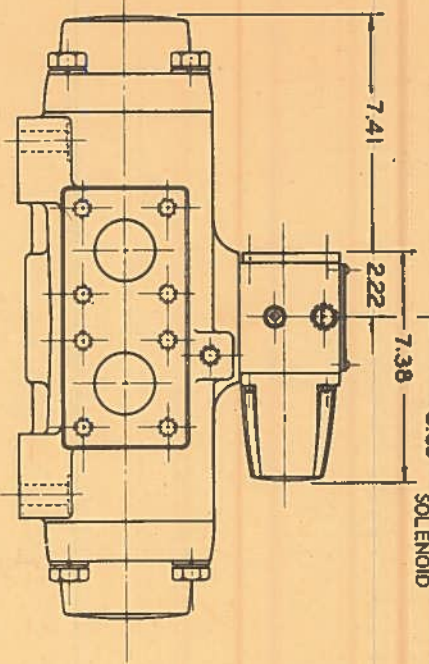


SPRING OFFSET



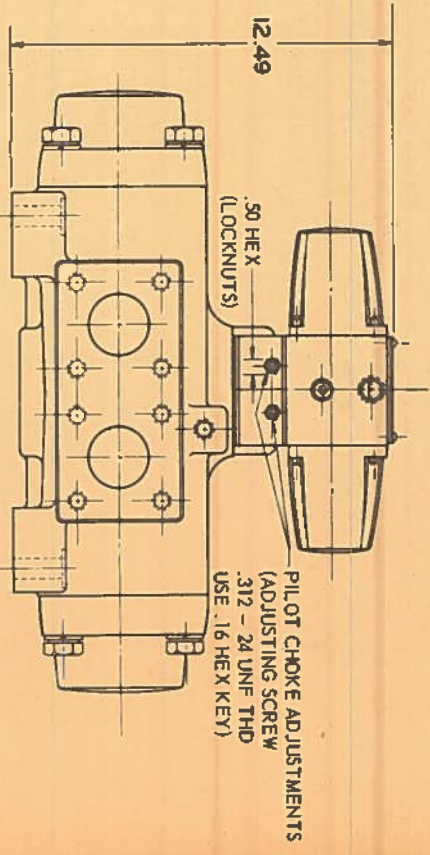
# SINGLE SOLENOID - SPRING OFFSET MODELS

CLEARANCE TO REMOVE  
SOLENOID



WEIGHT (APPROX.) 172 LBS.

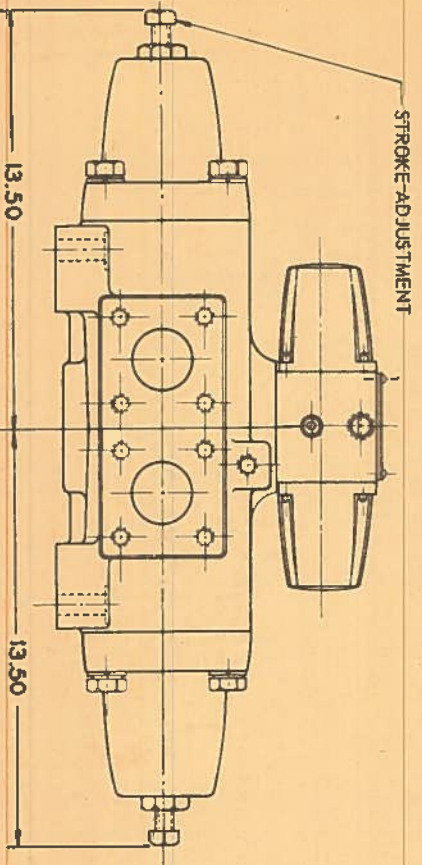
# MODELS WITH PILOT CHOKE ADJUSTMENTS



PILOT CHOKE ADJUSTED BY BACKING OFF LOCKNUTS AND TURNING ADJUSTING SCREWS OUT TO SLOW DOWN RATE OF SPOOL TRAVEL AND IN TO INCREASE THIS RATE.  
PILOT OIL FOR MODELS WITH THIS FEATURE SHOULD BE TAKEN FROM A SOURCE HAVING CONSTANT PRESSURE.

WEIGHT (APPROX.) 180 LBS.

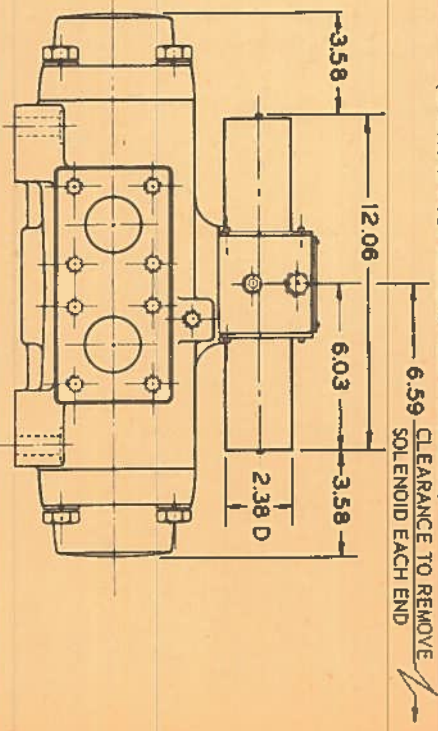
# MODELS WITH STROKE ADJUSTMENTS



STROKE ADJUSTMENTS LIMIT MOVEMENT OF MAIN STAGE SPOOL. (BACKING OFF JAM NUT AND TURNING ADJUSTING SCREW IN SHORTENS SPOOL STROKE.)

WEIGHT (APPROX.) 184 LBS.

# MODELS WITH DC SOLENOIDS (DOUBLE) (NO-SPRING DETENTED AND SPRING CENTERED TYPES) (SPRING OFFSET MODELS ALSO AVAILABLE)



WEIGHT (APPROX.) 176 LBS.



# VICKERS® SOLENOID CONTROLLED - PILOT OPERATED FOUR - WAY DIRECTIONAL VALVES

FLANGE CONNECTIONS

MODEL SERIES DF554 - 16

CONNECTION FLANGES MUST BE SPECIFIED IN ADDITION TO THE MODEL NUMBER OF THE UNIT SELECTED.

EXAMPLE: DF554-162C-50 VALVE, ONE (1)

FL-16-PS-20 FLANGE, FOUR (4)

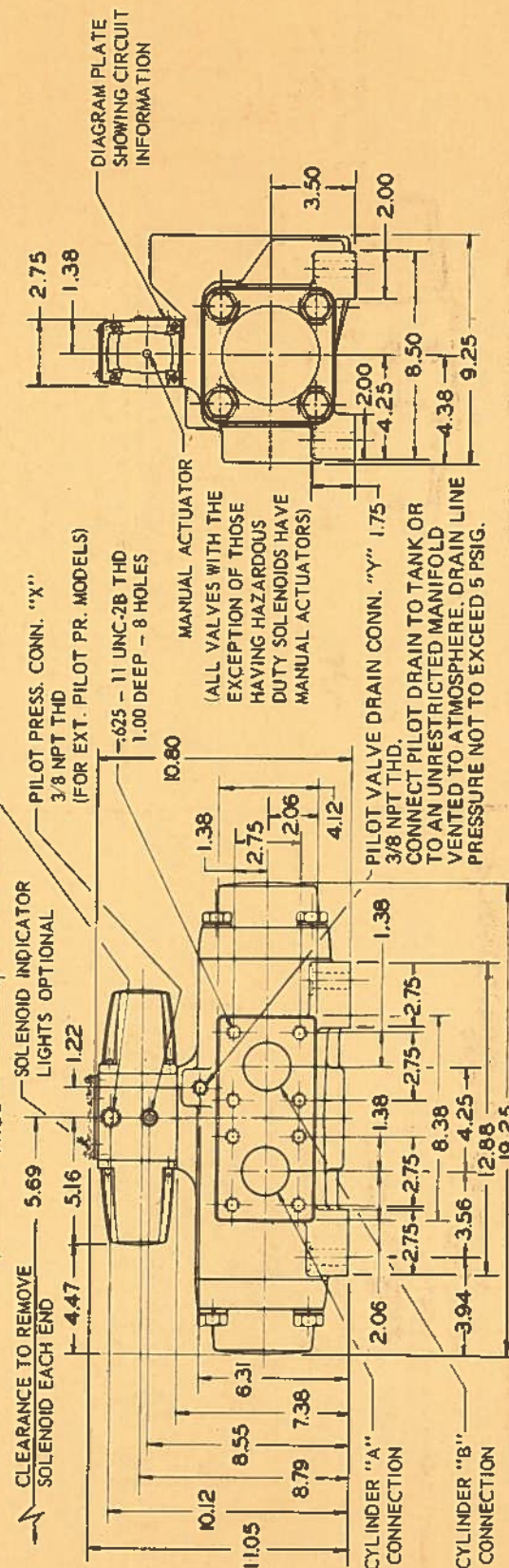
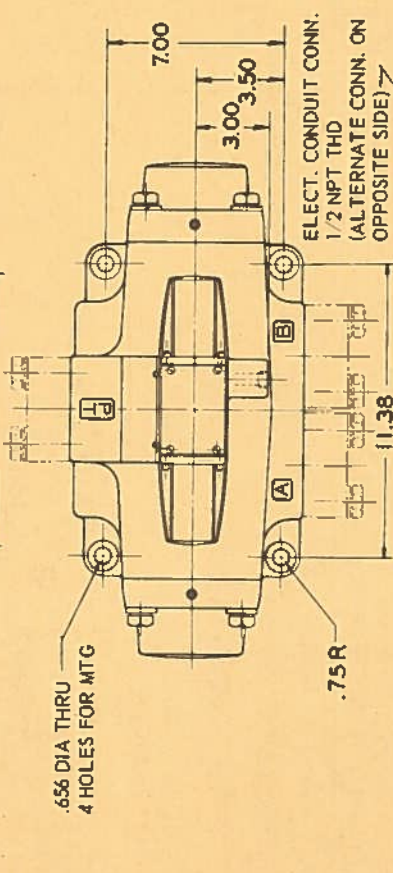
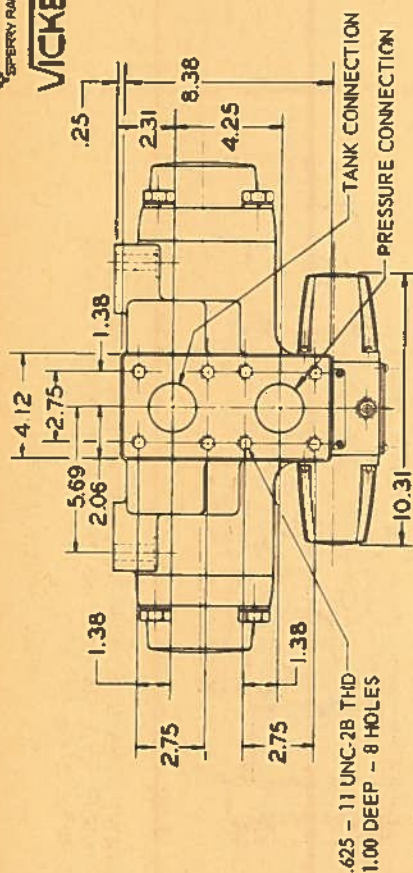
ALL FL-12 (1-1/2" PIPE SIZE) AND FL-16 (2" PIPE SIZE) FLANGES, AND THE FOLLOWING ELL OUTLET 3" PIPE SIZE FLANGES, ARE AVAILABLE:

FL-5-24-PL-20 (NPT THD)

FL-5-24-WL-20 (PIPE WELD)

STRAIGHT AND ELL OUTLET FLANGES ARE FURNISHED WITH A SEAL, SCREWS AND WASHERS FOR FASTENING. SEE DRAWING 522900 FOR 1-1/2 AND 2" FLANGE DIMENSIONS.

DOUBLE SOLENOID, NO-SPRING  
DETENTED AND SPRING CENTERED MODELS  
WEIGHT (APPROX.) 174 LBS



REVISED 1-3-72

VICKERS DIVISION  
OF SPERRY RAND CORPORATION  
TROY, MICHIGAN 48064

FLANGE  
CONNECTIONS

FOR 1-1/2, 2  
OR 3" PIPING

TO 350 GPM  
& 3000 PSI

SPRING CENTERED  
SPRING OFFSET & NO  
SPRING DETENTED MODELS

DWG NO.  
518100



WHEN USED AS OTHER THAN A NORMAL 4-WAY VALVE, CONSULT YOUR SPERRY VICKERS REPRESENTATIVE.

NOTE: SURGES OF OIL IN A COMMON PILOT VALVE DRAIN LINE, SERVING TWO OR MORE PILOT OPERATED 4-WAY VALVES, CAN BE OF SUFFICIENT MAGNITUDE TO CAUSE INADVERTENT SHIFTING OF THESE VALVES. THIS IS PARTICULARLY CRITICAL IN THE NO SPRING DETENTED TYPE VALVES. SEPARATE DRAIN LINES OR A VENTED DRAIN MANIFOLD WITH A CONTINUOUS DOWNWARD PATH TO TANK IS NECESSARY.

#### SUBPLATES AND BOLT KITS

VALVES, SUBPLATES AND MOUNTING BOLTS MUST BE ORDERED SEPARATELY. EXAMPLE:

ONE (1) DG554-102C-5" VALVE  
ONE (1) DG5M-10-11 SUBPLATE (SEE ALTERNATES)

ONE (1) BKDG10-636 BOLT KIT

MAXIMUM RECOMMENDED MOUNTING BOLT TORQUE: ..... 210 LB. FT.  
WHEN SUBPLATE IS NOT USED, A MACHINED PAD (AS INDICATED BY SUBPLATE SHADED AREA) MUST BE PROVIDED FOR MOUNTING; PAD MUST BE FLAT WITHIN .0005 INCH AND SMOOTH WITHIN 63 MICROINCH. MOUNTING BOLTS, WHEN PROVIDED BY CUSTOMER, SHOULD BE SAE GRADE 7, OR BETTER.

#### OPTIONAL FEATURES

PRESSURE CENTERED VALVES: THIS OPTION PROVIDES MORE POSITIVE CENTERING THROUGH GREATER FORCE. CENTERING SPRINGS ARE USED, IN ADDITION TO PILOT PRESSURE, TO ENSURE CENTERING (FLOW MUST BE WITHIN THE SPRING CENTERED RATINGS) SHOULD PILOT PRESSURE FAIL. SPRINGS CAN BE REMOVED BY THE USER IF NOT WANTED. PRESSURE CENTERED MODELS REQUIRE A MINIMUM OF 200 PSI FOR PILOT PRESSURE. THIS PRESSURE IS NOT AVAILABLE THROUGH USE OF AN INTEGRAL CHECK VALVE. (SEE DRAIN NOTE).

THE FOLLOWING CHART PROVIDES CENTERING TIMES FOR PRESSURE CENTERED MODELS. CENTERING TIMES FOR PRESSURE CENTERED MODELS ARE SHOWN WITH VARIOUS PILOT PRESSURES.

DG5 - PRESSURE CENTERING DG VALVES (TYPICAL CENTERING TIMES IN SECONDS)			
MODEL	PILOT PRESSURE (PSI)	"B" TO CENTER	"A" TO CENTER
DA	150	.104	.144
	250	.080	.108
	1000	.056	.064
DB	1000	.064	.085
	2000	.060	.080
D	2000	.065	.092
	3000	.060	.076

NOTE: ABOVE FIGURES FOR "DA" MODEL ARE WITH FAST RESPONSE OPTION. FAST RESPONSE OPTION NOT AVAILABLE WITH "D" OR "DB" MODELS.

FAST RESPONSE: USE OF THIS OPTION DECREASES THE SHIFT TIME. HOWEVER, THE SYSTEM SHOCK GENERATION IS CORRESPONDINGLY INCREASED.

THE FOLLOWING CHART PROVIDES SHIFT TIMES FOR FAST RESPONSE AND STANDARD SPRING CENTERED MODELS FOR VARIOUS PILOT PRESSURES.

TYPICAL SHIFT TIME IN SECONDS FOR AC MODELS		
PILOT PRESSURE (PSI)	STANDARD CENTER TO "A" OR "B"	FAST RESPONSE CENTER TO "A" OR "B"
500	.120	.060
1000	.085	.050
2000	.070	.040
3000	.055	.030

ALL SPRING CENTERED MODELS REQUIRE APPROXIMATELY .125 OF A SECOND TO CENTER FROM EITHER SIDE.

● BECAUSE OF THE HIGH DRAIN LINE PRESSURE TRANSIENTS GENERATED DURING SHIFTING, USE OF THE FAST RESPONSE OPTION IS NOT RECOMMENDED FOR PILOT PRESSURES EXCEEDING 2000 PSI. DC SHIFT TIMES WILL BE APPROXIMATELY THREE OR FOUR TIMES THE ABOVE AC VALUES.

INTEGRAL CHECK VALVES (IN PRESSURE PORT): FOR PILOT PRESSURE - IF INTERNAL PILOT VALVE DRAIN IS USED, THE PILOT PRESSURE IS DETERMINED FROM THE PRESSURE DROP THROUGH THE CHECK VALVE PLUS THE TOTAL PRESSURE DROP THROUGH THE VALVE (P → T) ON CENTER. IF EXTERNAL PILOT VALVE DRAIN IS USED, THE PILOT PRESSURE IS DETERMINED FROM THE PRESSURE DROP THROUGH THE CHECK VALVE PLUS THE TOTAL PRESSURE DROP THROUGH THE VALVE (P → T) PLUS OTHER PRESSURE DROPS DOWNSTREAM OF THE VALVE. FOR OTHER USES - A CHECK VALVE WITH 5 PSI CRACKING PRESSURE (K) CAN BE USED TO PREVENT REVERSE FLOW OTHER THAN LEAKAGE, SUCH AS IN CLAMP CIRCUITS, AND WHERE THE CHECK IS NOT REQUIRED FOR PILOT PRESSURE. (SEE CHART ON PAGE 518000A-3).

FLUIDS AND SEALS: THE USE OF SYNTHETIC, FIRE-RESISTANT FLUIDS REQUIRES A VALVE WITH SPECIAL SEALS. ADD PREFIX "F3" TO MODEL NUMBER WHEN PHOSPHATE ESTERS TYPE FLUIDS OR ITS BLENDS ARE TO BE USED. WATER GLYCOL, WATER-IN-OIL EMULSION FLUIDS AND PETROLEUM OIL MAY BE USED WITH STANDARD SEALS. REFER TO DATA SHEET 1-286-S (SECTION L) FOR HYDRAULIC FLUID AND TEMPERATURE RECOMMENDATIONS.

SOLENOID INDICATOR LIGHTS: LIGHTS ARE "ON" WHEN THERE IS VOLTAGE AT THE SOLENOIDS. LIGHTS ARE AVAILABLE FOR USE WITH 100 THRU 125 VOLT SERVICE SOLENOIDS ONLY. NOT AVAILABLE FOR HAZARDOUS DUTY TYPE MODELS.

#### PLUG-IN VALVES

VALVES WITH INSTA-PLUG FEATURE ARE SHOWN ON PAGE 2.

ELECTRICAL ACCESSORIES: DATA ON THE WIRING HOUSING, CIRCUIT BREAKER AND TERMINAL STRIP ARE SHOWN ON THE DG454-01\*50 PILOT VALVE DRAWING 517401 IN THIS SECTION.

GROUNDING: THE WIRING CAVITY OF THE PILOT VALVE HAS A DRILLED HOLE FOR A NO. 8 SELF TAPPING SCREW WHICH WILL PERMIT A GROUND WIRE TO BE SECURED TO THE PILOT VALVE BODY. A GROUND SYMBOL IS ADJACENT TO THIS HOLE.

THE INSTA PLUG RECEPTACLE (TOP SECTION) HAS A NO. 8-32 UNC-2B TAPPED HOLE AT THE BOTTOM FOR ATTACHING A GROUND CONNECTION. SEE DRAWING 517401 IN THIS SECTION (DG454-01\*50) FOR THE LOCATION OF THE GROUND CONNECTION IN OTHER ELECTRICAL ACCESSORIES.



# RATINGS AND SPECIFICATIONS

MAXIMUM OPERATING PRESSURE (SEE BELOW)..... 3000 PSI  
 MAXIMUM TANK LINE PRESSURE..... 3000 PSI  
 EXTERNAL DRAIN MODELS..... 1000 PSI  
 INTERNAL DRAIN MODELS..... 3000 PSI  
 PILOT PRESSURE (MAXIMUM)..... 3000 PSI

MINIMUM PILOT PRESSURE PSI ▲				
SPOOL TYPE	FLOW GPM	SHIFTING P → A		
		● PRESSURE CENTERED MODELS	ALL OTHER MODELS	SHIFTING P → B ALL OTHER MODELS
ALL SPOOLS	0	75	75	200
	0, 4, 8 & 9	75	75	200
	2, 3, 6 & 33	150	150	400
				75
				75
				150

▲ SEE DRAIN NOTES.

● ON PRESSURE CENTERED MODELS END COVERS CANNOT BE INTERCHANGED. PILOT PRESSURE IS NOT AVAILABLE THROUGH USE OF INTEGRAL CHECK VALVE.

NOTE: THE ABOVE CHART IS BASED ON INTERNALLY PILOTED AND EXTERNALLY DRAINED MODELS IN WHICH THE PILOT PRESSURE IS EQUAL TO THE PRESSURE AT THE VALVE PRESSURE PORT. WITH MODELS HAVING PRESSURE OPEN OR PARTIALLY OPEN TO TANK AT CENTER POSITION, PILOT PRESSURE CAN BE ASSURED BY IMPOSING A BACK PRESSURE OF AT LEAST THE REQUIRED MINIMUM PILOT PRESSURE AT THE TANK OUTLET CONNECTION (THIS BACK PRESSURE WILL BE PRESENT AT CYLINDER PORTS IF SPOOL IS "0", OR "9" TYPE).

WHEN PILOT PRESSURE FROM SEPARATE SOURCE (EXTERNAL) IS REQUIRED, AN EXTERNAL CONNECTION CAN BE PROVIDED. ORDER ACCORDING TO MODEL CODE.

## FLOW RATINGS

VALVE TYPE	SPOOL TYPE	RECOMMENDED FLOW CAPACITY	MAXIMUM FLOW WITHOUT MALFUNCTION
NO-SPRING DETENTED	0, 2, 6 & 9 ■	125 GPM	250 GPM AT 3000 PSI
	0, 4 & 8		
	2, 3, 6 & 33 ■		
SPRING CENTERED	9	85 GPM	85 GPM AT 3000 PSI 125 GPM AT 2000 PSI 150 GPM AT 1000 PSI
SPRING OFFSET	0, 2, 6 & 9 ■	125 GPM	250 GPM AT 3000 PSI
	0, 2, 3, 4, 6, 8, 9 & 33 ■		

■ AS SYSTEM FLOW INCREASES THE MINIMUM PILOT PRESSURE REQUIRED INCREASES. THESE SPOOLS WILL OPERATE SATISFACTORILY IN EXCESS OF 250 GPM WITH HIGHER PILOT PRESSURES.

## DRAINS

1. PILOT VALVE DRAIN: INTERNAL: TO PROVIDE MAXIMUM FLOW WITHOUT MALFUNCTION, PILOT PRESSURE OF INTERNALLY DRAINED VALVES MUST ALWAYS EXCEED TANK LINE BACK PRESSURE BY A MINIMUM OF 75 PSI FOR SPOOL TYPES "0", "4", "8", "9" AND A MINIMUM OF 150 PSI FOR ALL OTHER SPOOLS. INTERNALLY DRAINED VALVES MAY BE USED ONLY WHEN SURGES IN THE TANK LINE CANNOT POSSIBLY OVERCOME THIS DIFFERENTIAL. INTERNAL DRAIN MAY BE USED WITH ALL VALVES; HOWEVER, AN INTEGRAL PRES-SURE PORT CHECK VALVE (SEE OPTIONAL CHECK VALVE NOTE) IS REQUIRED FOR VALVES USING AN INTERNAL PILOT SOURCE WITH AN OPEN CENTER SPOOL (0, 4, 8 AND 9 TYPES) IN ORDER TO MAINTAIN PILOT PRESSURE. IF AN EXTERNAL PILOT SOURCE IS USED THEN AN INTEGRAL CHECK IS NOT REQUIRED. WHEN INTERNAL PILOT DRAIN IS REQUIRED, ORDER ACCORDING TO MODEL CODE. (PRESSURE CENTERED VALVES NOT INCLUDED).

EXTERNAL: WHEN THE POSSIBILITY OF PRESSURE SURGES IN THE TANK LINE EXISTS, EXTERNALLY DRAINED VALVES ARE RECOMMENDED. FOR EXTERNALLY DRAINED MODELS, THE PILOT VALVE DRAIN LINE MUST BE PIPED DIRECTLY TO TANK THROUGH A SURGE FREE LINE SO THERE WILL BE NO BACK PRESSURE AT THIS DRAIN. (REFERENCE CONNECTION "Y")

2. PRESSURE CENTERED DRAIN: (EXTERNAL ONLY)

EXTERNAL PILOT DRAIN NOTE ABOVE APPLIES TO "Y" DRAIN PORT. PRESSURE CENTERED "W" DRAIN CONNECTION MUST BE PIPED DIRECTLY TO TANK THROUGH A SURGE FREE LINE SO THERE WILL BE NO BACK PRESSURE AT THIS DRAIN.

FILTRATION RECOMMENDED..... 25 MICRON MOUNTING

POSITION: NO SPRING DETENTED MODELS MUST BE INSTALLED WITH THE LONGITUDINAL AXIS HORIZONTAL FOR GOOD MACHINE RELIABILITY. MOUNTING POSITION OF SPRING OFFSET AND SPRING CENTERED MODELS IS UNRESTRICTED PROVIDED THAT THE PILOT PRESSURE SUPPLY IS MAINTAINED AS REQUIRED. (SPRING OFFSET VALVES DO NOT HAVE A SPRING IN THE MAIN SPOOL SECTION.)

## SOLENOIDS

ELECTRIC SERVICE: 115V 60 Hz SOLENOIDS ARE STANDARD. SPECIFY IN MODEL NUMBER IF OTHER THAN 115 VOLT - 60 Hz SERVICE IS DESIRED. SEE MODEL CODE.

SOLENOID CURRENT APPROX. MAXIMUM	INRUSH amps	HOLDING amps	HOLDING WATTS
115 V ac - 60 Hz	5.1	.61	
115 V ac - 50/60 Hz	(50) 3.25 - (60) 4.97	(50) .56 - (60) .59	
230 V ac - 60 Hz	2.55	.32	
460 V ac - 60 Hz	1.27	.16	
6 V dc			24
12 V dc			24
24 V dc			24

## SHIFTING ACTION

SPRING CENTERED, PRESSURE CENTERED AND SPRING OFFSET MODELS MUST BE ENERGIZED CONTINUOUSLY TO MAINTAIN THE SHIFTED POSITION. DETENTED NO SPRING MODELS MAY BE ENERGIZED MOMENTARILY APPROXIMATELY 0.1 SECOND. PRESSURE CENTERED AND SPRING CENTERED MODELS RETURN VALVE SPOOL TO CENTER POSITION WHEN SOLENOIDS ARE DE-ENERGIZED. SPRING OFFSET MODELS RETURN SPOOL TO OFFSET POSITION BY PILOT PRESSURE WHEN SOLENOID IS DE-ENERGIZED.

WHEN NO SPRING DETENTED MODELS ARE DE-ENERGIZED, THE PILOT AND MAIN SPOOLS REMAIN IN THE LAST POSITION ATTAINED, PROVIDED THERE IS NO SHOCK, VIBRATION, UNUSUAL PRESSURE TRANSIENTS AND THE SPOOL AXIS IS HORIZONTAL. IF PILOT PRESSURE FAILS OR FALLS BELOW THE MINIMUM, THE MAIN SPOOL WILL SPRING CENTER (AT SPRING CENTERED FLOW RATES) AND CANNOT DRIFT TO REVERSAL OF FLOW (PILOT STAGE REMAINS IN DETENTED POSITION). CAUTION: BECAUSE OF THIS, THE FLOW CONDITIONS OF THE SPRING CENTERED POSITION MUST BE SELECTED WITH CARE, BOTH FOR THE EFFECT ON THE DIRECTION OF THE FLOW, AND THE PILOT PRESSURE. (THE "9" MAIN SPOOL WILL NOT ENSURE SUFFICIENT PILOT PRESSURE IN THE CENTER POSITION.)

PRESSURE CENTERED MODELS: VALVE SPOOL IS RETURNED TO CENTER POSITION BY PILOT PRESSURE. WHEN SOLENOIDS ARE DE-ENERGIZED, IF PILOT PRESSURE FAILS OR FALLS BELOW THE REQUIRED MINIMUM, THE VALVE SPOOL WILL SPRING RETURN TO CENTER POSITION. (AT SPRING CENTERED VALVE FLOW RATES.)

NOTE: ANY SLIDING SPOOL VALVE, IF HELD SHIFTED UNDER PRESSURE FOR LONG PERIODS OF TIME, MAY STICK AND NOT SPRING RETURN DUE TO FLUID RESIDUE FORMATION AND, THEREFORE, SHOULD BE CYCLED PERIODICALLY TO PREVENT THIS FROM HAPPENING.



# SPOOL TYPES AND MODEL COMBINATIONS - PRESSURE DROP DATA

SPOOL TYPE	CENTER POSITION	DESCRIPTION	PRESSURE DROP @ 125 GPM				
			P → A	B → T	P → B	A → T	CENTERED P → T
0		OPEN CENTER - ALL PORTS	45	73	51	65	55
2		CLOSED CENTER - ALL PORTS	55	83	55	76	-
3		CLOSED CENTER - P & B	55	83	55	48	-
4		TANDEM - CLOSED CROSSOVER	80	150	80	170	80
6		CLOSED CENTER - P ONLY	55	75	55	46	-
8		TANDEM - OPEN CROSSOVER	62	122	63	138	80
9		OPEN CENTER PARTIAL - ALL PORTS	46	75	50	70	400
33		CLOSED CENTER - BLEED A & B	55	83	55	76	-

1. FIGURES IN PRESSURE DROP CHART GIVE APPROXIMATE PRESSURE DROPS ( $\Delta P$ ) WHEN PASSING 125 GPM FLOW (Q) OF 100 SUS FLUID(S) HAVING .866 SPECIFIC GRAVITY.

2. FOR ANY OTHER FLOW RATE ( $Q_1$ ), THE PRESSURE DROP ( $\Delta P_1$ ) WILL BE APPROXIMATELY:  $\Delta P_1 = P (Q_1/Q)^2$ .

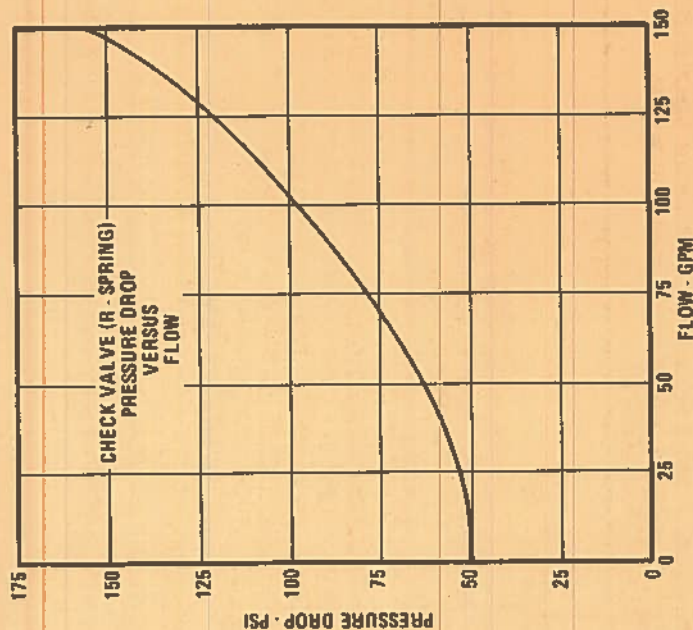
3. FOR ANY OTHER VISCOSITY(S), THE PRESSURE DROP ( $\Delta P$ ) WILL CHANGE AS FOLLOWS:

OTHER VISCOSITY(S) % OF $\Delta P$ (APPROX.)	75	150	200	250	300	350	400
	93	111	119	126	132	137	141

4. FOR ANY OTHER SPECIFIC GRAVITY ( $G_1$ ), THE PRESSURE DROP ( $\Delta P_1$ ) WILL BE APPROXIMATELY:  $\Delta P_1 = \Delta P (G_1/G)$ .

SPECIFIC GRAVITY OF FLUID MAY BE OBTAINED FROM ITS PRODUCER. THE VALUE IS HIGHER FOR FIRE-RESISTANT FLUIDS THAN FOR OIL.

NOTE: SEE PILOT PRESSURE AND SHIFTING ACTION NOTES ON NO SPRING DETENTED VALVE WITH "9" SPOOL.



TO DETERMINE CHECK VALVE CRACKING PRESSURE NEEDED TO PROVIDE PILOT PRESSURE CALCULATE TOTAL PRESSURE DROP THRU VALVE (P → T) ON CENTER AT MINIMUM FLOW. TOTAL PRESSURE DROP IS DETERMINED FROM PRESSURE DROP CHART FOR STANDARD VALVE AND ADDING PRESSURE DROP INDUCED BY CHECK VALVE (SEE GRAPH). TOTAL MUST BE GREATER THAN THE MINIMUM FOR GOOD MACHINE RELIABILITY. (SEE PILOT PRESSURE AND INTEGRAL CHECK VALVE NOTES.)

VALVE TYPE VS SPOOL TYPE AND GRAPHICAL SYMBOLS

DOUBLE SOLENOID VALVES		SINGLE SOLENOID	
DG5S4-10°C-5°	DG5S4-10°D-5°	DG5S4-10°N-5°	DG5S4-10°A-5°
SPRING CENTERED	PRESSURE CENTERED	NO-SPRING DETENTED	SPRING OFFSET
ALL SPOOLS	ALL SPOOLS	0-2-8-9 SPOOLS	0-2-8-9 SPOOLS

NOTE: WHEN SOLENOID "A" IS ENERGIZED, FLOW IS ALWAYS P → A. WHEN SOLENOID "B" IS ENERGIZED, FLOW IS ALWAYS P → B. SPRING OFFSET VALVES AS SHOWN (NOT LH) PORT P → A IN THE OFFSET POSITION. SOLENOIDS "A" AND "B" ARE IDENTIFIED ON THE DIAGRAM PLATE ON THE SIDE OF THE PILOT VALVE.

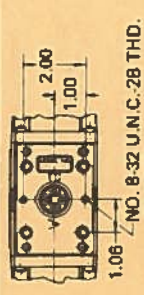


## INSTA-PLUG FOR SERIES DG5S4-10\*\*

SOLENOID INDICATOR LIGHTS (ON SPRING OFFSET ONLY) LIGHT IS ON SOLENOID END ONLY)



MODEL PDG5S4-10\*\*\*-5\* WITH INSTA-PLUG FEATURE AND SOLENOID INDICATOR LIGHTS



NO. 8-32 U.N.C. 28 THD. 56 DEEP 2 HOLES FOR MOUNTING RECEPTACLE BOX



MODEL PDG5S4-10\*\*\*-5\* WITH PLUG SECTION ONLY

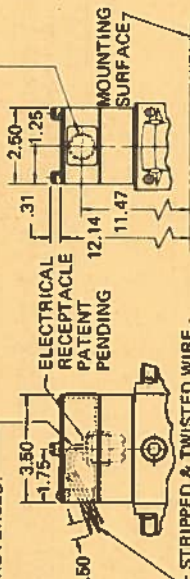
SOLENOIDS "A" & "B" ARE IDENTIFIED ON THE PLUG & RECEPTACLE CASTINGS & CORRESPOND WITH SOLENOID IDENTIFICATION PLATE



WARNING TAG ELECTRICAL POWER MUST BE DISCONNECTED BEFORE REMOVING OR REPLACING THIS RECEPTACLE.

SEE PAGE 5 FOR NOTE ON GROUNDING. ELECTRICAL CONDUIT CONN. 1/2 NPTF THD.

4 LEADS APPROX. 7.00 LONG. WHITE LEADS ARE CONNECTED TO SOLENOID "A" & BLACK LEADS ARE CONNECTED TO SOLENOID "B" (SEE DIAGRAM PLATE). FOR TYPE 4 & 8 SPOOLS CONDUIT CONNECTION LOCATION IS REVERSED.



STRIPPED & TWISTED WIRE 4 LEADS (2 LEADS ON SPRING OFFSET MODELS)

MODEL PDG5S4-10\*\*\*-5\* WITH INSTA-PLUG FEATURE (WITHOUT SOLENOID INDICATOR LIGHTS)

## INSTA-PLUG FEATURES

THE INSTA-PLUG CONSISTS OF THE FOLLOWING FEATURES:

1. SECTION "A", A FOUR-PRONGED SELF-ALIGNING ELECTRICAL PLUG SECURED IN A HOUSING THAT IS MOUNTED ON TOP CENTER OF THE VALVE BODY WHERE THE SOLENOID LEADS TERMINATE; OR:
2. A "B" COMPLETE INSTA-PLUG ASSEMBLY THAT INCLUDES THE "A" HOUSING ON TOP OF WHICH RESTS A SIMILAR HOUSING CONTAINING THE MATING RECEPTACLE. THE TWO HOUSINGS ARE KEPT TO ASSURE PROPER HOOK-UPS.

THE TOP HOUSING IS REMOVED FROM THE LOWER ("A") HOUSING TO BREAK THE ELECTRICAL CONNECTIONS TO THE VALVE SOLENOIDS OR PRESSED ONTO THE "A" HOUSING TO COMPLETE THE CIRCUIT. THE ASSEMBLY IS HELD TOGETHER BY TWO SLOTTED THUMB SCREWS.

SOLENOID INDICATOR LIGHTS WITH NAMEPLATE ARE PART OF THE RECEPTACLE WHEN SPECIFIED.

CONNECTIONS TO THE ELECTRIC POWER ARE MADE THROUGH THE END OF THE RECEPTACLE HOUSING AND CAN BE PREPARED BY THE CUSTOMER. END LOCATION OF ELECTRICAL CONDUIT PORT PERMITS SPACE-SAVING SIDE-BY-SIDE VALVE MOUNTING. WIRE LEADS APPROXIMATELY 7" LONG ARE PROVIDED WHEN NO LIGHTS ARE SPECIFIED. MODELS WITH LIGHTS HAVE TERMINALS INSIDE THE RECEPTACLE HOUSING. AFTER INITIAL INSTALLATION, ELECTRICAL AND HYDRAULIC CONNECTIONS NEED NOT BE DISTURBED WHEN VALVE WITH INSTA-PLUG IS REMOVED.

NOTE: SOLENOIDS "A" AND "B" ARE IDENTIFIED ON THE PLUG-IN AND RECEPTACLE HOUSINGS; THEY CORRESPOND WITH SOLENOID IDENTIFICATION PLATE. IN CASE OF TANDEN VALVES (NO. 4 AND 8 SPOOLS), THE INSTA-PLUG IS ROTATED 180° AND CONDUIT CONNECTION IS ON THE OPPOSITE END FROM THAT SHOWN.

WEIGHT (APPROX.) INSTA-PLUG ONLY. .... 1.0 LB.

## MODEL CODE

SPECIAL SEALS (OMIT IF NOT REQUIRED). SEE FLUIDS AND SEALS NOTE.

X - SOLENOIDS FOR HAZARDOUS LOCATIONS  
XM - SOLENOIDS FOR MINING APPLICATIONS. "X" OR "XM" NOT AVAILABLE ON PLUG-IN TYPE VALVES. (OMIT IF NOT REQUIRED.)

VALVES WITH INSTA-PLUG FEATURE (OMIT IF NOT REQUIRED.)  
INSTA-PLUG: "A" VALVE WITH PLUG ONLY  
"B" VALVE WITH PLUG AND RECEPTACLE

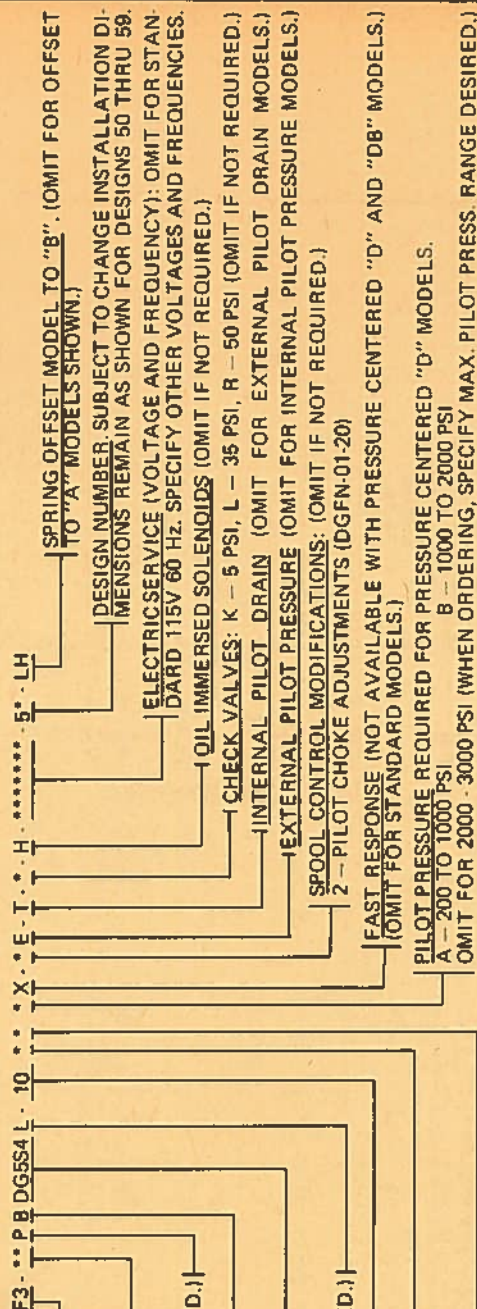
DIRECTIONAL CONTROL VALVE: SUBPLATE MOUNTING, SOLENOID CONTROLLED, PILOT OPERATED, SLIDING SPOOL, 4-WAY FLOW DIRECTION.

SOLENOID INDICATOR LIGHTS (OMIT IF NOT REQUIRED.)  
1 1/4" VALVE SIZE

SPOOL TYPES: 0, 2, 3, 4, 6, 8, 9, 33. SEE MODEL NUMBER TABULATION ON PAGE 3 FOR DESCRIPTION.

SPOOL SPRING ARRANGEMENT:

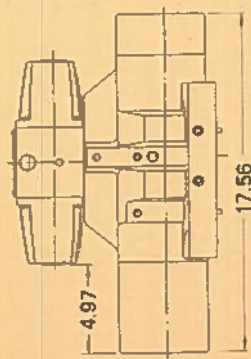
A - SPRING OFFSET D - PRESSURE CENTERED  
C - SPRING CENTERED N - NO-SPRING DETENTED



SEE DRAWING 517401 FOR DG4S4-01\*50 IN THIS SECTION FOR CODING OF OTHER ELECTRICAL ACCESSORIES.



# DOUBLE SOLENOID PRESSURE CENTERED MODELS



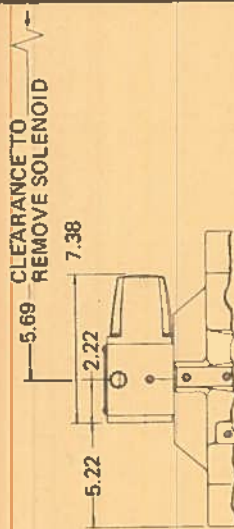
PRESSURE CENTERED TYPE MODELS ARE ALSO AVAILABLE WITH THE FOLLOWING FEATURES:

1. DC SOLENOIDS
2. HAZARDOUS DUTY SOLENOIDS
3. OIL IMMERSIBLE SOLENOIDS
4. SOLENOID INDICATOR LIGHTS
5. "INSTA"-PLUG
6. PILOT CHOKE ADJUSTMENTS

WEIGHT (APPROX.) 104 LBS.

SEE DRAWING OF DG4S4-01\*\*50 NO. 517401-5/6 IN THIS SECTION FOR OTHER ELECTRICAL ACCESSORIES.

# SINGLE SOLENOID - SPRING OFFSET



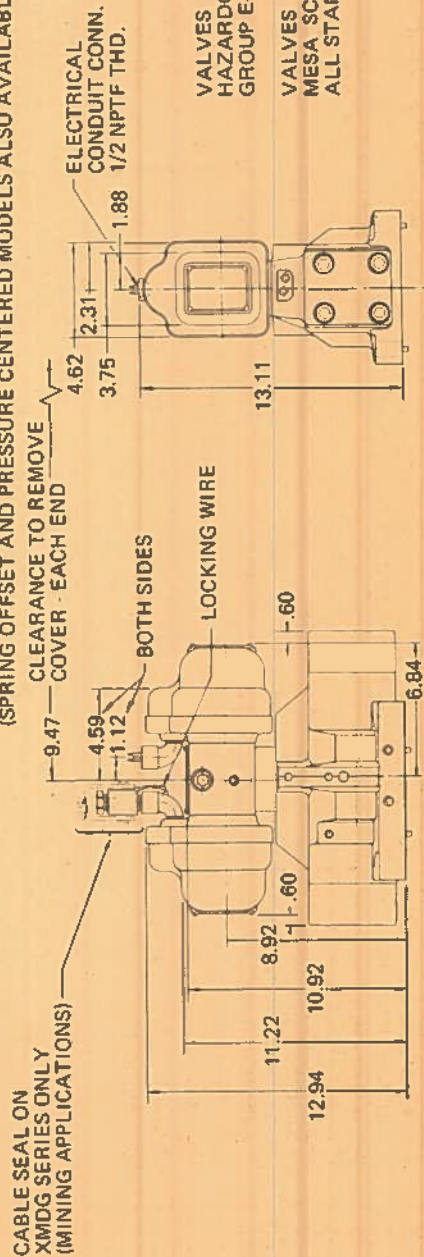
WEIGHT (APPROX.) 96 LBS.

MODELS WITH DC SOLENOIDS (DOUBLE) NO-SPRING DETENTED, PRESSURE-CENTERED AND SPRING CENTERED MODELS (SPRING OFFSET MODELS ALSO AVAILABLE)



WEIGHT (APPROX.) 100 LBS.

DOUBLE SOLENOID NO SPRING DETENTED AND SPRING CENTERED VALVES FOR HAZARDOUS LOCATIONS AND MINING APPLICATIONS (SPRING OFFSET AND PRESSURE CENTERED MODELS ALSO AVAILABLE)

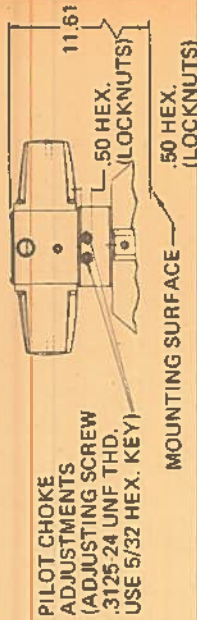


VALVES HAVE "UL LISTED" SOLENOIDS FOR USE IN HAZARDOUS LOCATIONS - CLASS I GROUP D, CLASS II GROUP E-F-G, FOR 115 AND 230 V ac, 60 Hz SERVICE.

VALVES FOR MINING APPLICATIONS ARE BUILT TO MESA SCHEDULE 2G - FILE X/P837-2. AVAILABLE IN ALL STANDARD VOLTAGES.

WEIGHT (APPROX.) 104 LBS.

# MODELS WITH PILOT CHOKE ADJUSTMENTS

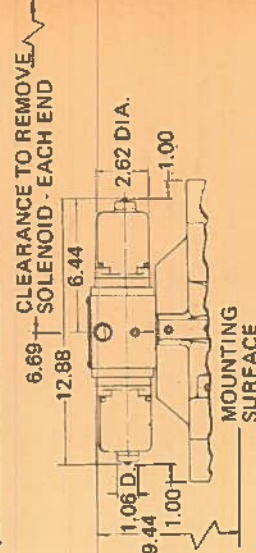


PILOT CHOKE ADJUSTED BY BACKING OFF LOCKNUTS AND TURNING ADJUSTING SCREWS OUT TO SLOW DOWN RATE OF SPOOL TRAVEL AND IN TO INCREASE THIS RATE.

PILOT OIL FOR MODELS WITH THIS FEATURE SHOULD BE TAKEN FROM A SOURCE HAVING CONSTANT PRESSURE.

WEIGHT (APPROX.) 104 LBS.

MODELS WITH OIL IMMERSIBLE TYPE SOLENOIDS (DOUBLE) NO SPRING DETENTED, PRESSURE CENTERED AND SPRING CENTERED MODELS (SPRING OFFSET MODELS ALSO AVAILABLE)



WEIGHT (APPROX.) 101 LBS.



## GENERAL USAGE

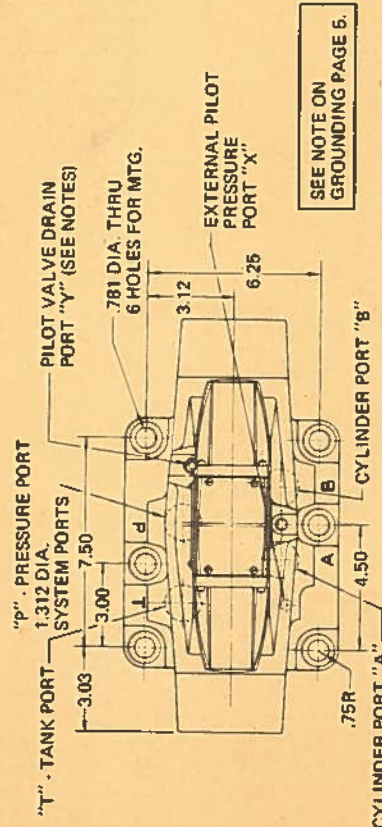
THESE VALVES ARE GENERALLY USED TO CONTROL THE DIRECTION OF FLOW IN A HYDRAULIC CIRCUIT. THIS, IN TURN, WOULD CONTROL THE DIRECTION OF MOVEMENT OF A FLUID CYLINDER, OR THE ROTATION OF A FLUID MOTOR.

## SPECIFICATIONS

**SYSTEM PRESSURE AND FLOW**

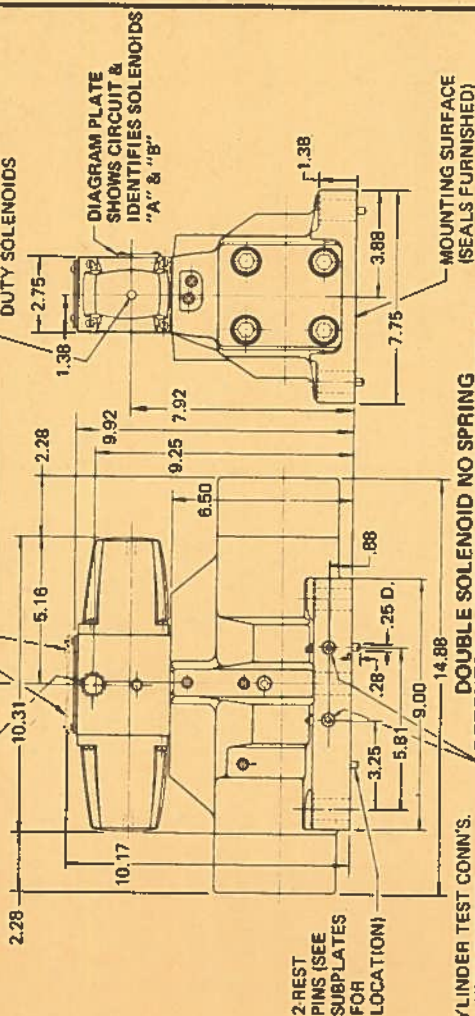
MAXIMUM OPERATING PRESSURE (SEE FLOW RATINGS).....	3000 PSI
MAXIMUM TANK LINE PRESSURE:	
EXTERNAL DRAIN MODELS.....	3000 PSI
INTERNAL DRAIN MODELS.....	1000 PSI
PILOT PRESSURE.....	(SEE NOTES)
RECOMMENDED FLOW AT 3000 PSI.....	● TO 125 GPM
MAXIMUM FLOW AND PRESSURE WITHOUT MALFUNCTION.....	● TO 250 GPM

● SEE FLOW RATINGS PAGE 4.

SEE NOTE ON  
GROUNDING PAGE 5.

**SOLENOID INDICATOR LIGHTS (OPTIONAL)**

5.69 CLEARANCE TO REMOVE SOLENOID - BOTH ENDS



CYLINDER TEST CONN'S.  
1/4 NPTF THREAD ———  
DOUBLE SOLENOID NO SPRING  
DETENTED & SPRING CENTERED MODELS  
WEIGHT (APPROX.) 98 LBS.  
REVISED 2-2-76

REVISÉ 2-2-76

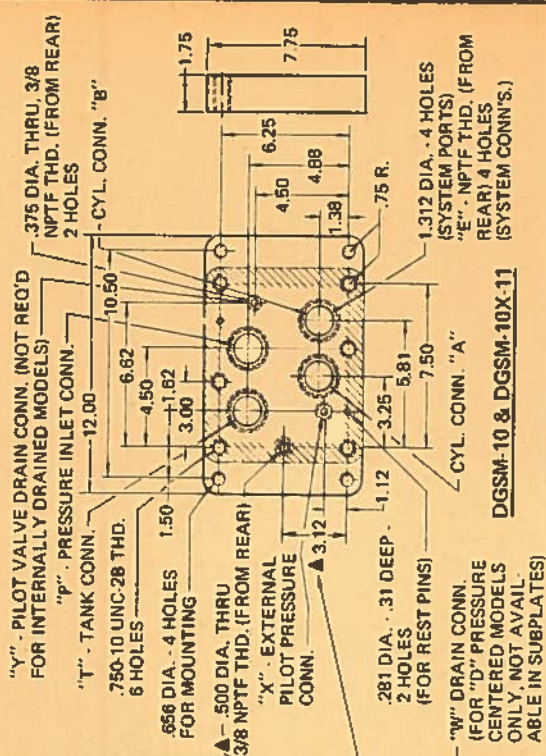
**WEIGHT (APPROX.) 98 LBS.**

**SPERRY VICKERS**  
POWER AND MOTION  
CONTROL SYSTEMS

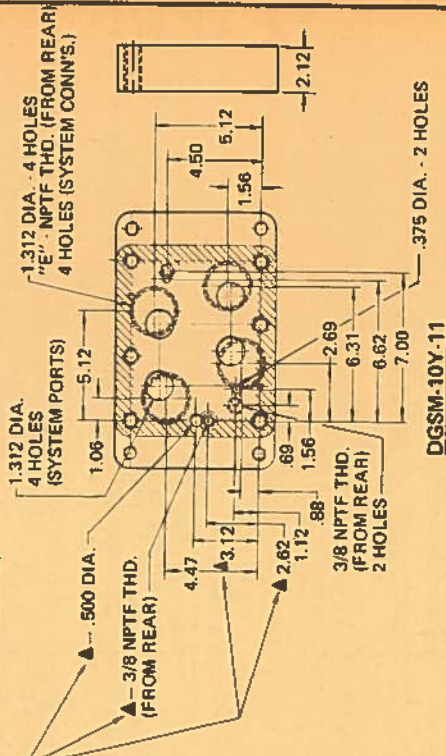
**SOLENOID CONTROLLED -  
PILOT OPERATED FOUR-WAY**  
SERIES DG5S4-10\*\*5\*

**SOLENOID CONTROLLED PILOT OPERATED 4-WAY VALVES  
MANIFOLD OR SUBPLATE MOUNTING**

## MOUNTING SUBPLATES



**DGSM-10 & DGSM-10X-11**



DGS-10Y-11

SUBPLATE MODEL NO.	"E" NPTF THD.	WEIGHT (APPROX.)
DGSM-10-11	1-1/4	38 LBS.
DGSM-10X-11	1-1/2	
DGSM-10Y-11	2"	46 LBS.

▲ - SUBPLATES DGSM-10-11, DGSM-10X-11 & DGSM-10Y-11 HAVE NO "W" DRAIN CONNECTION.

518000A



WHEN USED AS OTHER THAN A NORMAL 4-WAY VALVE, CONSULT YOUR SPERRY VICKERS REPRESENTATIVE.

NOTE: SURGES OF OIL IN A COMMON PILOT VALVE DRAIN LINE, SERVING TWO OR MORE PILOT OPERATED 4-WAY VALVES, CAN BE OF SUFFICIENT MAGNITUDE TO CAUSE INADVERTENT SHIFTING OF THESE VALVES. THIS IS PARTICULARLY CRITICAL IN THE NO SPRING DETENTED TYPE VALVES. SEPARATE DRAIN LINES OR A VENTED DRAIN MANIFOLD WITH A CONTINUOUS DOWNWARD PATH TO TANK IS NECESSARY.

#### SUBPLATES AND BOLT KITS

VALVES, SUBPLATES AND MOUNTING BOLTS MUST BE ORDERED SEPARATELY. EXAMPLE:

ONE (1) DG5S4-H062C-5\* VALVE  
ONE (1) DG5M-06Y-5\* SUBPLATE  
ONE (1) BKDGH06-618 BOLT KIT

MAXIMUM RECOMMENDED MOUNTING BOLT TORQUE..... 700 IN. LBS.

NOTE: CENTER MOUNTING BOLTS (2) ARE OPTIONAL. ALL SIX BOLTS ARE RECOMMENDED FOR PRESSURE RANGE OF 2000 TO 3000 PSI FOR MAXIMUM SEAL LIFE.

WHEN SUBPLATE IS NOT USED, A MACHINED PAD (AS INDICATED BY SUBPLATE SHADED-AREA) MUST BE PROVIDED FOR MOUNTING. PAD MUST BE FLAT WITHIN .0005 INCH AND SMOOTH WITHIN 63 MICROINCH. MOUNTING BOLTS, WHEN PROVIDED BY CUSTOMER, SHOULD BE SAE GRADE 7, OR BETTER.

ADAPTER PLATES DGAM-06-5\* AND FOR PRESSURE CENTERED MODELS DGAM-06-0-5\* WITH "W" DRAIN ARE AVAILABLE TO ADAPT THE DG5S4-H06\*\*-5\* SERIES TO PRESENT DG5S4-10\*\*-5\* SERIES INSTALLATIONS. (SEE GRAPHICS).

SAE STRAIGHT THREADED SUBPLATES AVAILABLE ON REQUEST. SIDE CONNECTION SUBPLATES ALSO AVAILABLE WITH 3/4 AND 1" NPT F THD'S.

#### OPTIONAL FEATURES

FAST RESPONSE: USE OF THIS OPTION DECREASES THE SHIFT TIME APPROXIMATELY 60 PERCENT. HOWEVER, THE SYSTEM SHOCK GENERATION IS CORRESPONDINGLY INCREASED.

THE FOLLOWING CHART PROVIDES SHIFT TIMES FOR FAST RESPONSE AND STANDARD SPRING CENTERED MODELS FOR VARIOUS PILOT PRESSURES.

PILOT PRESSURE (PSI)	TYPICAL SHIFT TIMES IN SECONDS	
	STANDARD CENTER TO "A" OR "B"	FAST RESPONSE CENTER TO "A" OR "B"
500	.100	.080
1000	.085	.050
2000	.060	.030
3000	.045	.020

ALL SPRING CENTERED MODELS REQUIRE APPROXIMATELY 0.110 OF A SECOND TO CENTER FROM EITHER SIDE.

\*BECAUSE OF THE HIGH DRAIN LINE PRESSURE TRANSIENTS GENERATED DURING SHIFTING, USE OF THE FAST RESPONSE OPTION IS NOT RECOMMENDED FOR PILOT PRESSURES EXCEEDING 2000 PSI. DC SHIFT TIMES WILL BE APPROXIMATELY THREE OR FOUR TIMES THE ABOVE AC VALUES.

INTEGRAL CHECK VALVES (IN PRESSURE PORT): FOR PILOT PRESSURE - IF INTERNAL PILOT VALVE DRAIN IS USED, THE PILOT PRESSURE IS DETERMINED FROM THE PRESSURE DROP THROUGH THE CHECK VALVE PLUS THE TOTAL PRESSURE DROP THROUGH THE VALVE (P → T) ON CENTER. IF EXTERNAL PILOT VALVE DRAIN IS USED, THE PILOT PRESSURE IS DETERMINED FROM THE PRESSURE DROP THROUGH THE CHECK VALVE PLUS THE TOTAL PRESSURE DROP THROUGH THE VALVE (P → T) PLUS OTHER PRESURE DROPS DOWNSTREAM OF THE VALVE. FOR OTHER USES - A CHECK VALVE WITH 5 PSI CRACKING PRESSURE (K) CAN BE USED TO PREVENT REVERSE FLOW OTHER THAN LEAKAGE, SUCH AS IN CLAMP CIRCUITS, AND WHERE THE CHECK IS NOT REQUIRED FOR PILOT PRESSURE. (SEE CHART ON PAGE 517920-3.)

FLUIDS AND SEALS: THE USE OF SYNTHETIC, FIRE-RESISTANT FLUIDS REQUIRES A VALVE WITH SPECIAL SEALS. ADD PREFIX "F3" TO MODEL NUMBER WHEN PHOSPHATE ESTERS TYPE FLUIDS OR ITS BLENDS ARE TO BE USED. WATER GLYCOL, WATER-IN-OIL EMULSION FLUIDS AND PETROLEUM OIL MAY BE USED WITH STANDARD SEALS. REFER TO DATA SHEET 1-286-S (SECTION L) FOR FLUID AND TEMPERATURE RECOMMENDATIONS.

SOLENOID INDICATOR LIGHTS: LIGHTS ARE "ON" WHEN THERE IS CURRENT AT THE SOLENOIDS. ON SPRING OFFSET MODELS, LIGHT IS ON SOLENOID END ONLY. LIGHTS ARE AVAILABLE FOR USE WITH 100 THRU 125 VOLT SERVICE SOLENOIDS ONLY. NOT AVAILABLE FOR HAZARDOUS DUTY TYPE MODELS.

#### PLUG-IN VALVES

VALVES WITH INSTA-PLUG FEATURE ARE SHOWN ON PAGE 517920-2.

OTHER ELECTRICAL ACCESSORIES - SEE DRAWING 517401 (DG4S4-01) IN THIS SECTION.

#### GROUNDING

THE WIRING CAVITY OF THE PILOT VALVE HAS A DRILLED HOLE FOR A NO. 8 SELF TAPPING SCREW WHICH WILL PERMIT A GROUND WIRE TO BE SECURED TO THE PILOT VALVE BODY. A GROUND SYMBOL IS ADJACENT TO THIS HOLE.

THE INSTA PLUG RECEPTACLE (TOP SECTION) HAS A NO. 8-32 UNC-2B TAPPED HOLE AT THE BOTTOM FOR ATTACHING A GROUND CONNECTION. SEE DRAWING 517401 IN THIS SECTION (DG4S4-01\*50) FOR THE LOCATION OF THE GROUND CONNECTION IN OTHER ELECTRICAL ACCESSORIES.



## RATINGS AND SPECIFICATIONS

MAXIMUM OPERATING PRESSURE (SEE BELOW) ..... 3000 PSI  
 MAXIMUM TANK LINE PRESSURE ..... 3000 PSI  
 EXTERNAL DRAIN MODELS ..... 1000 PSI  
 PILOT PRESSURE (MAXIMUM) (SEE FAST RESPONSE NOTE) ..... 3000 PSI

MINIMUM PILOT PRESSURE PSI			
SPOOL TYPE	SHIFTING P → A		SHIFTING P → B
	● PRESSURE CENTERED MODELS	ALL OTHER MODELS	ALL OTHER MODELS
0, 2, 3, 4, 6, 8 & 33	75	75	75
0, 100 & 160	85	85	85
0, 4, 8	75	75	75
2, 3, 6 & 33	150	150	150

▲ SPRING OFFSET 150 PSI.

● ON PRESSURE CENTERED MODELS END COVERS CANNOT BE INTERCHANGED. PILOT PRESSURE IS NOT AVAILABLE THROUGH USE OF INTEGRAL CHECK VALVE.

NOTE: THE PILOT PRESSURE SOURCE IN MODELS TABULATED IS CONNECTED INTERNALLY WITH PRESSURE INLET CONNECTION AND IS EQUAL TO PRESSURE AT PRESSURE PORT. WITH MODELS HAVING PRESSURE OPEN OR PARTIALLY OPEN TO TANK AT CENTER POSITION, PILOT PRESSURE CAN BE ASSURED BY IMPOSING A BACK PRESSURE OF AT LEAST THE REQUIRED MINIMUM PILOT PRESSURE AT THE TANK OUTLET CONNECTION (THIS BACK PRESSURE WILL BE PRESENT AT CYLINDER PORTS IF SPOOL IS "0", OR "9" TYPE).

WHEN PILOT PRESSURE FROM SEPARATE SOURCE (EXTERNAL) IS REQUIRED, AN EXTERNAL CONNECTION CAN BE PROVIDED. ORDER ACCORDING TO MODEL CODE.

## FLOW RATINGS

VALVE TYPE	SPOOL TYPE	RECOMMENDED FLOW CAPACITY	MAXIMUM FLOW WITHOUT MALFUNCTION
NO SPRING DETENTED	0, 2, 6 & 9	80 GPM	160 GPM AT 3000 PSI
	2, 3, 6, 33		
SPRING CENTERED	0, 4, 8		100 GPM AT 2000 PSI
	9		
SPRING OFFSET	0, 2, 6 & 9	160 GPM AT 3000 PSI	100 GPM AT 3000 PSI
	2, 3, 4, 6, 8 & 33		
PRESSURE CENTERED	9		

■ AS SYSTEM FLOW INCREASES THE MINIMUM PILOT PRESSURE REQUIRED INCREASES. THESE SPOOLS WILL OPERATE SATISFACTORILY IN EXCESS OF 160 GPM WITH HIGHER PILOT PRESSURE. ALL SPOOLS IN PRESSURE CENTERED MODELS WILL OPERATE SATISFACTORILY IN EXCESS OF GPM SHOWN WITH HIGHER PILOT PRESSURE.

## DRAINS

1. PILOT VALVE DRAIN:  
 INTERNAL: TO PROVIDE MAXIMUM FLOW WITHOUT MALFUNCTION, PILOT PRESSURE OF INTERNALLY DRAINED VALVES MUST ALWAYS EXCEED TANK LINE BACK PRESSURE BY A MINIMUM OF 75 PSI FOR SPOOL TYPES "0", "4", "8", "165 PSI FOR "9", AND A MINIMUM OF 150 PSI FOR ALL OTHER SPOOLS. INTERNALLY DRAINED VALVES MAY BE USED ONLY WHEN SURGES IN THE TANK LINE CANNOT POSSIBLY OVERCOME THIS DIFFERENTIAL. INTERNAL DRAIN MAY BE USED WITH ALL VALVES, HOWEVER, AN INTEGRAL PRESSURE PORT CHECK VALVE (SEE OPTIONAL CHECK VALVE NOTE) IS REQUIRED FOR VALVES USING AN INTERNAL PILOT SOURCE WITH AN OPEN CENTER SPOOL (0, 4, 8 AND 9 TYPES) IN ORDER TO MAINTAIN PILOT PRESSURE IF AN EXTERNAL PILOT SOURCE IS USED THEN AN INTEGRAL CHECK IS NOT REQUIRED. WHEN INTERNAL PILOT DRAIN IS REQUIRED, ORDER ACCORDING TO MODEL CODE.

EXTERNAL: WHEN THE POSSIBILITY OF PRESSURE SURGES IN THE TANK LINE EXISTS, EXTERNALLY DRAINED VALVES ARE RECOMMENDED. FOR EXTERNALLY DRAINED MODELS, THE PILOT VALVE DRAIN LINE MUST BE PIPED DIRECTLY TO TANK THROUGH A SURGE FREE LINE SO THERE WILL BE NO BACK PRESSURE AT THIS DRAIN. (REFERENCE CONNECTION "Y")

FILTRATION RECOMMENDED ..... 35 MICRON ABSOLUTE OR FINER

## MOUNTING

POSITION: NO SPRING DETENTED MODELS MUST BE INSTALLED WITH THE LONGITUDINAL AXIS HORIZONTAL FOR GOOD MACHINE RELIABILITY. MOUNTING POSITION OF SPRING OFFSET AND SPRING CENTERED MODELS IS UNRESTRICTED PROVIDED THAT THE PILOT PRESSURE SUPPLY IS MAINTAINED AS REQUIRED. (SPRING OFFSET VALVES DO NOT HAVE A SPRING IN THE MAIN SPOOL SECTION.)

## SOLENOIDS

ELECTRIC SERVICE: SOLENOIDS ON MODELS LISTED ARE FOR 115 VOLT - 60 HZ SERVICE. SPECIFY IN MODEL NUMBER IF OTHER THAN 115 VOLT - 60 HZ SERVICE IS DESIRED. SEE MODEL CODE.

SOLENOID CURRENT APPROX. MAXIMUM	INRUSH AMPS	HOLDING AMPS	HOLDING WATTS
115 VOLT - 60 Hz	5.1	.61	
115 VOLT - 50/60 Hz	(50) 3.25 - (60) 4.97	(50) .56 - (60) .59	
230 VOLT - 60 Hz	2.55	.32	
460 VOLT - 60 Hz	1.27	.16	
6 VOLT - DC			24
12 VOLT - DC			24
24 VOLT - DC			24

## SHIFTING ACTION

SPRING CENTERED, AND SPRING OFFSET MODELS MUST BE ENERGIZED CONTINUOUSLY. DETENTED NO-SPRING MODELS MAY BE ENERGIZED MOMENTARILY APPROXIMATELY 0.1 SECOND. SPRING CENTERED MODELS RETURN VALVE SPOOL TO CENTER POSITION WHEN BOTH SOLENOIDS ARE DE-ENERGIZED. SPRING OFFSET MODELS RETURN SPOOL TO OFFSET POSITION BY PILOT PRESSURE WHEN SOLENOID IS DE-ENERGIZED.

WHEN NO SPRING DETENTED MODELS ARE DE-ENERGIZED, THE PILOT AND MAIN SPOOLS REMAIN IN THE LAST POSITION ATTAINED, PROVIDED THERE IS NO SHOCK, VIBRATION, UNUSUAL PRESSURE TRANSIENTS AND THE SPOOL AXIS IS HORIZONTAL. IF PILOT PRESSURE FAILS OR FALLS BELOW THE MINIMUM, THE MAIN SPOOL WILL SPRING CENTER (AT SPRING CENTERED FLOW RATES) AND CANNOT DRIFT TO REVERSAL OF FLOW (PILOT STAGE REMAINS IN DETENTED POSITION). CAUTION: BECAUSE OF THIS, THE FLOW CONDITIONS OF THE SPRING CENTERED POSITION MUST BE SELECTED WITH CARE, BOTH FOR THE EFFECT ON THE DIRECTION OF THE FLOW, AND THE PILOT PRESSURE. (THE "9" MAIN SPOOL WILL NOT ENSURE SUFFICIENT PILOT PRESSURE IN THE CENTER POSITION.)

NOTE: ANY SLIDING SPOOL VALVE, IF HELD SHIFTED UNDER PRESSURE FOR LONG PERIODS OF TIME, MAY STICK AND NOT SPRING RETURN DUE TO FLUID RESIDUE FORMATION AND, THEREFORE, SHOULD BE CYCLED PERIODICALLY TO PREVENT THIS FROM HAPPENING.



# SPPOOL TYPES AND MODEL COMBINATIONS – PRESSURE DROP DATA

SPPOOL TYPE	CENTER POSITION	DESCRIPTION	PRESSURE DROP @ 80 GPM				
			P → A	B → P	P → B	A → T	CENTERED P → T
0		OPEN CENTER ALL PORTS	30	38	30	45	35
2		CLOSED CENTER ALL PORTS	28	45	40	37	—
3		CLOSED CENTER P & B	28	45	40	37	—
4		TANDEM CLOSED Crossover	35	60	60	37	50
6		CLOSED CENTER P ONLY	28	38	40	37	—
8		TANDEM OPEN Crossover	28	40	40	30	50
9		OPEN CENTER PARTIAL - ALL PORTS	34	34	32	40	250
33		CLOSED CENTER BLEED A & B	28	45	40	37	—

1. FIGURES IN PRESSURE DROP CHART GIVE APPROXIMATE PRESSURE DROPS (ΔP) WHEN PASSING 80 GPM FLOW (Q) OF 100 SUS FLUID(S) HAVING 865 SPECIFIC GRAVITY.

2. FOR ANY OTHER FLOW RATE (Q<sub>1</sub>), THE PRESSURE DROP (ΔP<sub>1</sub>) WILL BE APPROXIMATELY:  $\Delta P_1 = P (Q_1/Q)^2$ .

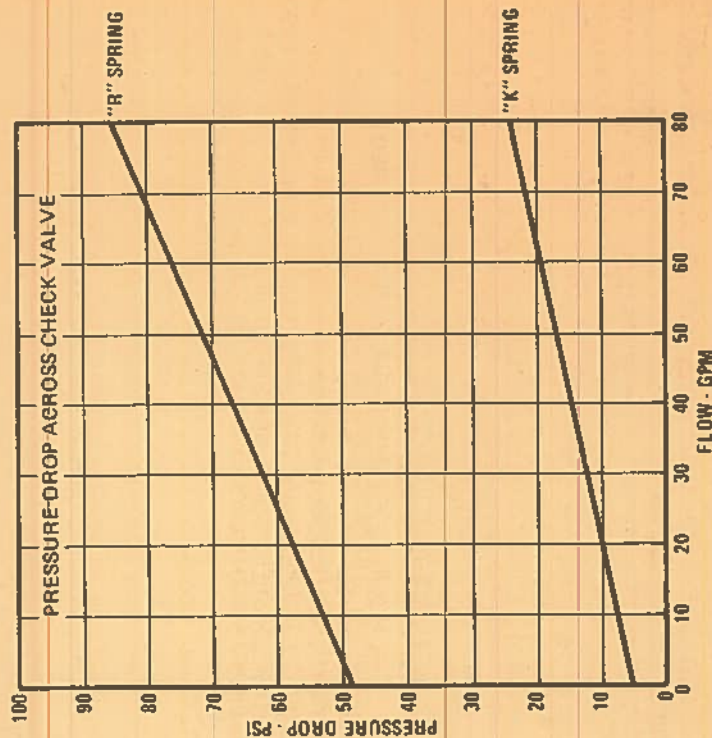
3. FOR ANY OTHER VISCOSITY(S), THE PRESSURE DROP (ΔP) WILL CHANGE AS FOLLOWS:

OTHER VISCOSITY(S)	75	150	200	250	300	350	400
% OF ΔP (APPROX.)	93	111	119	126	132	137	141

4. FOR ANY OTHER SPECIFIC GRAVITY (G<sub>1</sub>), THE PRESSURE DROP (ΔP<sub>1</sub>) WILL BE APPROXIMATELY:  $\Delta P_1 = \Delta P (G_1/G)$ .

1 SPECIFIC GRAVITY OF FLUID MAY BE OBTAINED FROM ITS PRODUCER. THE VALUE IS HIGHER FOR FIRE RESISTANT FLUIDS THAN FOR OIL.

NOTE: SEE PILOT PRESSURE AND SHIFTING ACTION NOTES ON NO SPRING DETENTED VALVE WITH "9" SPOOL.



TO DETERMINE CHECK VALVE CRACKING PRESSURE NEEDED TO PROVIDE PILOT PRESSURE CALCULATE TOTAL PRESSURE DROP THRU VALVE (P → T) ON CENTER AT MINIMUM FLOW. TOTAL PRESSURE DROP IS DETERMINED FROM PRESSURE DROP CHART FOR STANDARD VALVE AND ADDING PRESSURE DROP INDUCED BY CHECK VALVE (SEE GRAPH). TOTAL MUST BE GREATER THAN 75 PSI FOR GOOD MACHINE RELIABILITY. (SEE PILOT PRESSURE AND INTEGRAL CHECK VALVE NOTES.)

## VALVE TYPE VS SPOOL TYPE AND GRAPHICAL SYMBOLS

DOUBLE SOL. VALVES		SINGLE SOL.
DG554-H06-C-5*	DG554-H06-N-5*	
 SPRING CENTERED	 NO SPRING DETENTED	 SPRING OFFSET
ALL SPOOLS	0-2-6-9 SPOOLS	0-2-6-9 SPOOLS

NOTE: WHEN SOLENOID "A" IS ENERGIZED, FLOW IS ALWAYS P → A. WHEN SOLENOID "B" IS ENERGIZED, FLOW IS ALWAYS P → B. SPRING OFFSET VALVES AS SHOWN (NOT LH) PORT P → A IN THE OFFSET POSITION. SOLENOIDS "A" AND "B" ARE IDENTIFIED ON THE DIAGRAM PLATE ON THE SIDE OF THE PILOT VALVE.

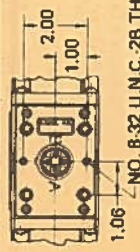


# INSTA-PLUG FOR SERIES DG5S4-H06

SOLENOID INDICATOR LIGHTS (ON SPRING OFFSET UNITS LIGHT IS ON SOLENOID END ONLY)



MODEL PDG5S4L-H06\*\*\*-51  
WITH INSTA-PLUG FEATURE AND  
SOLENOID INDICATOR LIGHTS



NO. 8-32 U.N.C. 28 THD.

58 DEEP  
2 HOLES FOR MOUNTING  
RECEPTACLE BOX



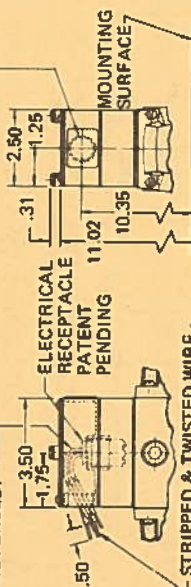
MODEL PDG5S4-H06\*\*\*-51  
WITH PLUG SECTION ONLY

SOLENOIDS "A" & "B" ARE IDENTIFIED  
ON THE PLUG & RECEPTACLE CASTINGS  
& CORRESPOND WITH SOLENOID  
IDENTIFICATION PLATE



WARNING TAG  
ELECTRIC  
POWER MUST  
BE DISCONNECTED  
BEFORE REMOVING  
OR REPLACING  
THIS RECEPTACLE.  
(SEE GROUND NOTE)

4 LEADS APPROX. 7.00  
LONG. WHITE LEADS ARE  
CONNECTED TO SOLENOID "A"  
& BLACK LEADS ARE CONNECTED  
TO SOLENOID "B" (SEE DIAGRAM  
PLATE). FOR TYPE 4 & 8 SPOOLS  
CONDUIT CONNECTION LOCATION  
IS REVERSED.



STRIPPED & TWISTED WIRE.  
4 LEADS (2 LEADS ON SPRING  
OFFSET MODELS)

MODEL PDG5S4-H06\*\*\*-51 WITH INSTA-PLUG FEATURE  
(WITHOUT SOLENOID INDICATOR LIGHTS)

## INSTA-PLUG FEATURES

THE INSTA-PLUG CONSISTS OF THE FOLLOWING FEATURES:

1. SECTION "A", A FOUR-PRONGED SELF-ALIGNING ELECTRICAL PLUG SECURED IN A HOUSING THAT IS MOUNTED ON TOP CENTER OF THE VALVE BODY WHERE THE SOLENOID LEADS TERMINATE; OR:
2. A "B" COMPLETE INSTA-PLUG ASSEMBLY THAT INCLUDES THE "A" HOUSING ON TOP OF WHICH RESTS A SIMILAR HOUSING CONTAINING THE MATING RECEPTACLE. THE TWO HOUSINGS ARE KEYS TO ASSURE PROPER HOOK-UPS.

THE TOP HOUSING IS REMOVED FROM THE LOWER ("A") HOUSING TO BREAK THE ELECTRICAL CONNECTIONS TO THE VALVE SOLENOIDS OR PRESSED ONTO THE "A" HOUSING TO COMPLETE THE CIRCUIT. THE ASSEMBLY IS HELD TOGETHER BY TWO SLOTTED THUMB SCREWS.

SOLENOID INDICATOR LIGHTS WITH NAMEPLATE ARE PART OF THE RECEPTACLE WHEN SPECIFIED.

CONNECTIONS TO THE ELECTRIC POWER ARE MADE THROUGH THE END OF THE RECEPTACLE HOUSING AND CAN BE PREPARED BY THE CUSTOMER. END LOCATION OF ELECTRICAL CONDUIT PORT PERMITS SPACE-SAVING SIDE-BY-SIDE VALVE MOUNTING. WIRE LEADS APPROXIMATELY 7" LONG ARE PROVIDED WHEN NO LIGHTS ARE SPECIFIED. MODELS WITH LIGHTS HAVE TERMINALS INSIDE THE RECEPTACLE HOUSING. AFTER INITIAL INSTALLATION, ELECTRICAL AND HYDRAULIC CONNECTIONS NEED NOT BE DISTURBED WHEN VALVE WITH INSTA-PLUG IS REMOVED.

NOTE: SOLENOIDS "A" AND "B" ARE IDENTIFIED ON THE PLUG-IN AND RECEPTACLE HOUSINGS; THEY CORRESPOND WITH SOLENOID IDENTIFICATION PLATE. IN CASE OF TANDEM VALVES (NO. 4 AND 8 SPOOLS) AND LH MODELS, THE INSTA-PLUG IS ROTATED 180° AND CONDUIT CONNECTION IS ON THE OPPOSITE END FROM THAT SHOWN.

WEIGHT (APPROX.) INSTA-PLUG ONLY. .... 1.0 LB.

## MODEL CODE

SPECIAL SEALS (OMIT IF NOT REQUIRED). SEE  
FLUIDS AND SEALS NOTE.

X - SOLENOIDS FOR HAZARDOUS LOCATIONS  
NOT AVAILABLE ON PLUG-IN TYPE VALVES.  
(OMIT IF NOT REQUIRED)

VALVES WITH INSTA-PLUG FEATURE (OMIT IF NOT REQ'D.)  
INSTA-PLUG: "A" VALVE WITH PLUG ONLY  
"B" VALVE WITH PLUG AND RECEPTACLE

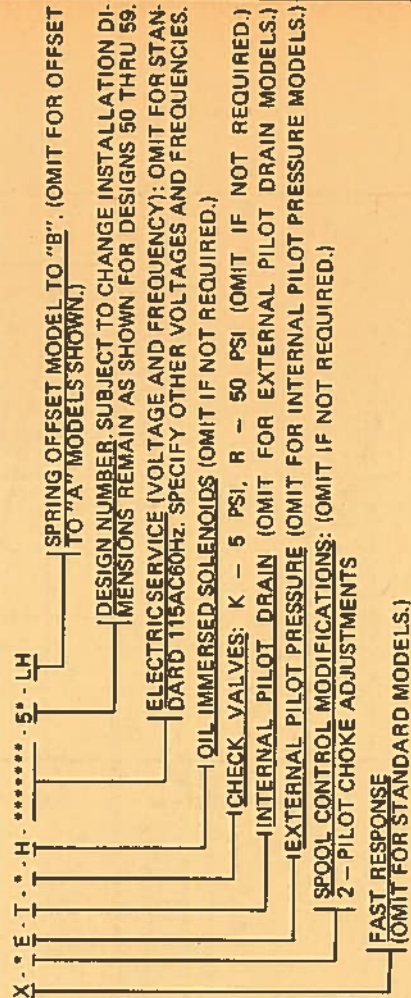
DIRECTIONAL CONTROL VALVE: SUBPLATE MOUNT-  
ING, SOLENOID CONTROLLED, PILOT OPERATED,  
SLIDING SPOOL, 4-WAY FLOW DIRECTION.

SOLENOID INDICATOR LIGHTS (OMIT IF NOT REQUIRED.)  
HIGH FLOW "3/4" VALVE SIZE

SPOOL TYPES: 0, 2, 3, 4, 6, 8, 9, 33. SEE MODEL NUMBER  
TABULATION ON PAGE 3 FOR DESCRIPTION.

SPOOL-SPRING ARRANGEMENT:

A - SPRING OFFSET N - NO-SPRING DETENTED  
C - SPRING CENTERED



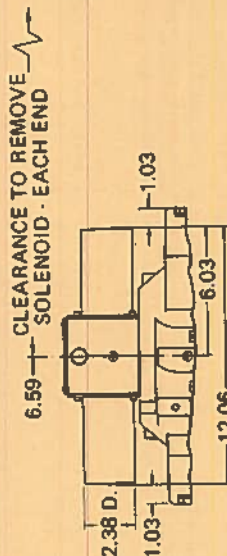


# SINGLE SOLENOID - SPRING OFFSET



WEIGHT LBS. (APPROX.) 55

MODELS WITH DC SOLENOIDS (DOUBLE)  
NO-SPRING DETENTED AND  
SPRING-CENTERED TYPES  
(SPRING OFFSET MODELS ALSO AVAILABLE)



WEIGHT LBS. (APPROX.) 59

# MOUNTING ADAPTER PLATE

H06 SERIES (DG5) DIRECTIONAL  
CONTROL VALVE.



SUBPLATE FOR 100 SERIES (DG5)  
VALVE OR EQUIVALENT  
MACHINED MOUNTING PAD.

DGAM-06-50 ADAPTER PLATE  
REST PINS "O" RING SEALS AND  
PLATE MOUNTING SCREWS ARE  
SUPPLIED WITH THESE ADAPTER  
PLATES.

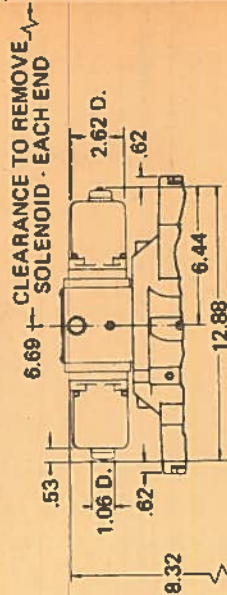
# MODELS WITH PILOT CHOKE ADJUSTMENTS



PILOT CHOKE ADJUSTED BY BACKING OFF LOCKNUTS AND  
TURNING ADJUSTING SCREWS OUT TO SLOW DOWN RATE  
OF SPOOL TRAVEL AND IN TO INCREASE THIS RATE.  
PILOT OIL FOR MODELS WITH THIS FEATURE SHOULD BE  
TAKEN FROM A SOURCE HAVING CONSTANT PRESSURE.

WEIGHT LBS. (APPROX.) 63

MODELS WITH OIL IMMERSSED TYPE SOLENOIDS (DOUBLE)  
NO-SPRING DETENTED AND SPRING CENTERED MODELS  
(SPRING OFFSET MODELS ALSO AVAILABLE)



WEIGHT LBS. (APPROX.) 60

DOUBLE SOLENOID NO-SPRING DETENTED AND SPRING CENTERED  
VALVES FOR HAZARDOUS LOCATIONS  
(SPRING OFFSET MODELS ALSO AVAILABLE)



VALVES HAVE "UL LISTED" SOLENOIDS  
FOR USE IN HAZARDOUS LOCATIONS -  
CLASS I GROUP D, CLASS II GROUP E-F-G,  
FOR 115 AND 230 V ac, 60 Hz SERVICE.

WEIGHT LBS. (APPROX.) 63

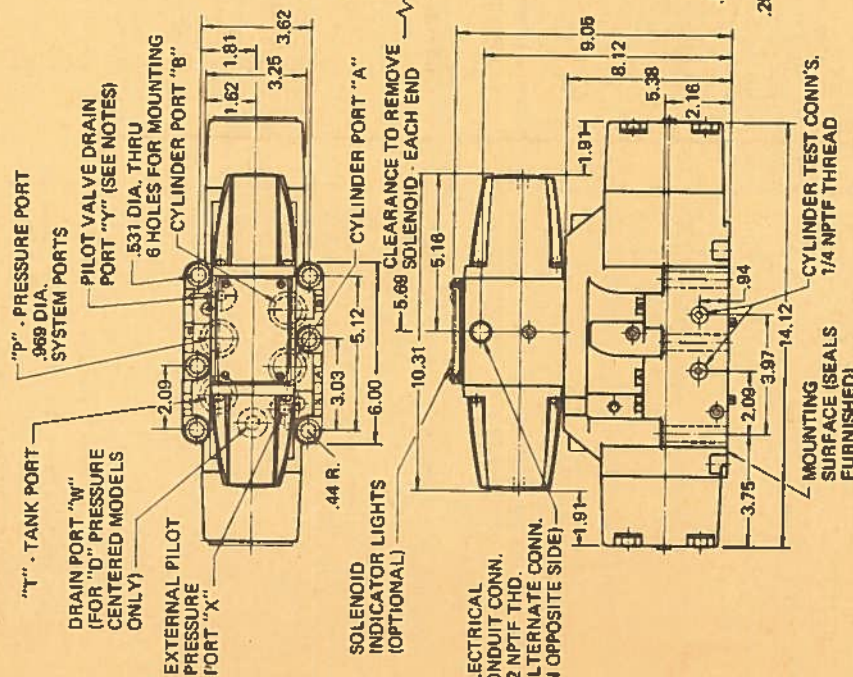


**SPERRY VICKERS**  
TROY, MICHIGAN 48084

**GENERAL USAGE**  
THESE VALVES ARE GENERALLY USED TO CONTROL THE DIRECTION OF FLOW IN A HYDRAULIC CIRCUIT. THIS, IN TURN, WOULD CONTROL THE DIRECTION OF MOVEMENT OF A WORK CYLINDER, OR THE ROTATION OF A FLUID MOTOR.

**SPECIFICATIONS**  
SYSTEM PRESSURE AND FLOW  
MAXIMUM OPERATING PRESSURE (SEE FLOW RATINGS)..... 3000 PSI  
MAXIMUM TANK LINE PRESSURE:  
EXTERNAL DRAIN MODELS..... 3000 PSI  
INTERNAL DRAIN MODELS..... 1000 PSI (SEE NOTES)  
PILOT PRESSURE.....  
RECOMMENDED FLOW AT 3000 PSI..... 80 GPM  
MAXIMUM FLOW AND PRESSURE WITHOUT MALFUNCTION:  
SPRING CENTERED MODEL WITH TYPE "g" SPOOL..... 160 GPM @ 2000 PSI  
ALL OTHER MODELS..... 160 GPM @ 3000 PSI

(SEE GROUND NOTE)



DOUBLE SOLENOID NO SPRING  
DETENTED & SPRING CENTERED MODELS  
REVISED 12-1-78 WEIGHT LBS. (APPROX.) 57

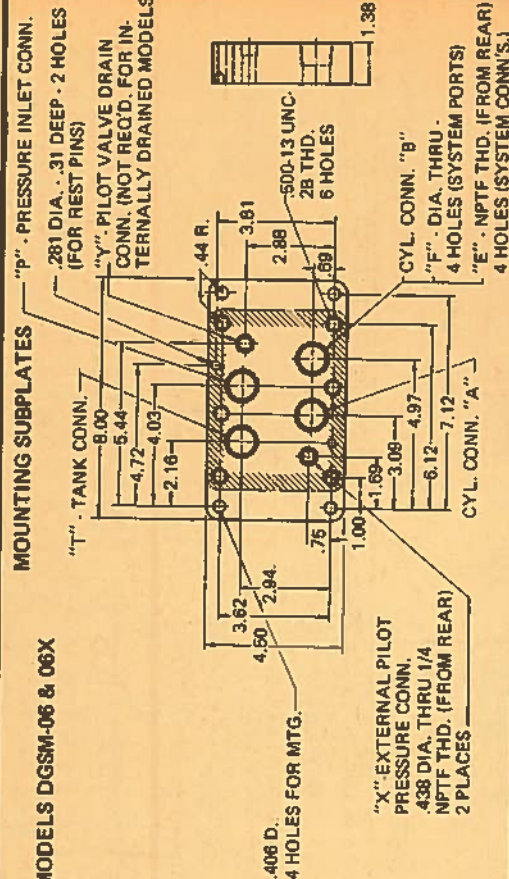
**SPERRY VICKERS**  
POWER AND MOTION  
CONTROL SYSTEMS

**SOLENOID CONTROLLED -  
PILOT OPERATED FOUR-WAY**  
SERIES DG5S4-H06\*\*5\*

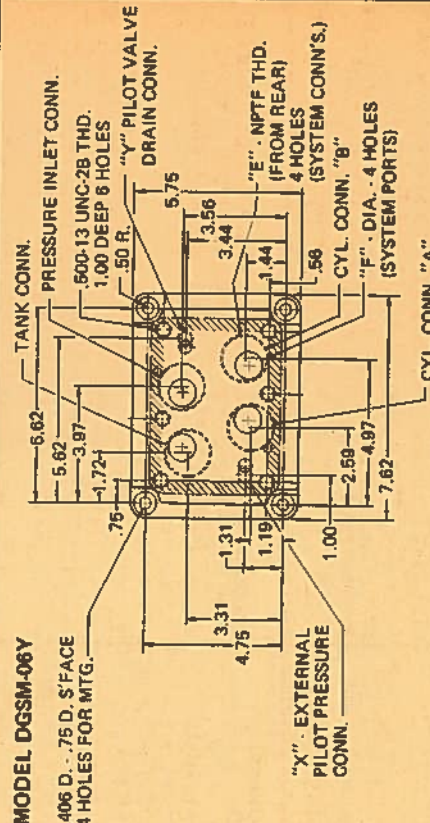
SOLENOID CONTROLLED PILOT OPERATED 4-WAY VALVES  
MANIFOLD OR SUBPLATE MOUNTED

MODELS DGSM-06 & 06X

MOUNTING SUBPLATES



MODEL DGSM-06Y



NOTE: FOR OTHER  
DIM'S. SEE ABOVE

MODEL NUMBER	"E" NPTF THREAD	"F" DIA.	WEIGHT (APPROX.)
DGSM-06-50	3/4"	.908	11 LBS.
DGSM-06X-50	1"	.969	16 LBS.
DGSM-06Y-50	1-1/4"		

517920

SPRING CENTERED,  
SPRING OFFSET AND  
NO-SPRING DETENTED MODELS

TO 160 GPM  
& 3000 PSI

FOR 3/4"  
1", 1-1/4" PIPING

MANIFOLD OR  
SUBPLATE  
MOUNTING

DWG. NO.  
517920



**SPEERY VICKERS INSTA-PLUG<sup>TM</sup>**

FOR SERIES DG5S4-08  
T.M.

## INSTA-PLUG FEATURES

**THE INSTA-PLUG CONSISTS OF THE FOLLOWING FEATURES:**

1. SECTION "A", A FOUR-PRONGED SELF-ALIGNING ELECTRICAL PLUG SECURED IN A HOUSING THAT IS MOUNTED ON TOP CENTER OF THE VALVE BODY WHERE THE SOLENOID LEADS TERMINATE; OR:
2. A "B" COMPLETE INSTA-PLUG ASSEMBLY THAT INCLUDES THE "A" HOUSING ON TOP OF WHICH RESTS A SIMILAR HOUSING CONTAINING THE MATING RECEPTACLE. THE TWO HOUSINGS ARE KEYS TO ASSURE PROPER HOOK-UPS.

THE TOP HOUSING IS REMOVED FROM THE LOWER ("A") HOUSING TO BREAK THE ELECTRICAL CONNECTIONS TO THE VALVE SOLENOIDS OR PRESSED ONTO THE "A" HOUSING TO COMPLETE THE CIRCUIT. THE ASSEMBLY IS HELD TOGETHER BY TWO SLOTTED THUMB SCREWS.

**A NAMEPLATE AND SOLENOID INDICATOR LIGHTS ARE PART OF THE RECEPTACLE WHEN SPECIFIED.**

CONNECTIONS TO THE ELECTRIC POWER ARE MADE THROUGH THE END OF THE RECEPTACLE HOUSING AND CAN BE PREWIRED BY THE CUSTOMER. END LOCATION OF ELECTRICAL CONDUIT PORT PERMITS SPACE-SAVING SIDE-BY-SIDE VALVE MOUNTING.

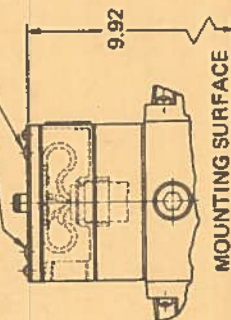
WIRE LEADS APPROXIMATELY 7" LONG ARE PROVIDED WHEN NO LIGHTS ARE SPECIFIED. MODELS WITH LIGHTS HAVE TERMINALS INSIDE THE RECEPTACLE HOUSING.

**AFTER INITIAL INSTALLATION, ELECTRICAL AND HYDRAULIC CONNECTIONS NEED NOT BE DISTURBED WHEN VALVE WITH INSTA-PLUG IS REMOVED.**

**NOTE**  
SOLENOIDS "A" AND "B" ARE IDENTIFIED ON THE  
PLUG-IN AND RECEPTACLE HOUSINGS; THEY CORRE-  
SPOND WITH SOLENOID IDENTIFICATION PLATE. IN  
CASE OF TANDEM VALVES (NO. 4 AND 8 SPOOLS),  
THE INSTA-PLUG IS ROTATED 180° AND CONDUIT  
CONNECTION IS ON THE OPPOSITE END THAN THAT  
SHOWN.

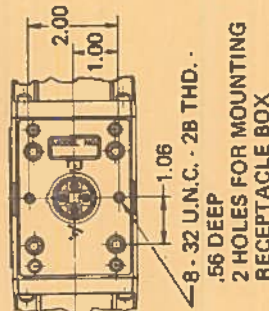
**WEIGHT (APPROX.) INSTA-PLUG ONLY..... 1.0 LB.**

SOLENOID INDICATOR LIGHTS (ON  
SPRING OFFSET UNITS LIGHT IS ON  
SOLENOID END ONLY) —



MODEL PBDG5S4L-08\*\*-50

**WITH INSTA-PLUG FEATURE AND  
SOLENOID INDICATOR LIGHTS**



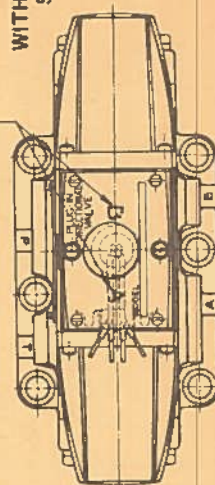
**ELECTRICAL PLUG  
PATENT PENDING**



**MODEL PADG5S4-06\*\*.\*.50  
WITH PLUG SECTION ONLY**

**DOUBLE SOLENOID NO-SPRING DETENTED,  
SPRING CENTERED, PRESSURE CENTERED AND SPRING OFFSET MODELS**

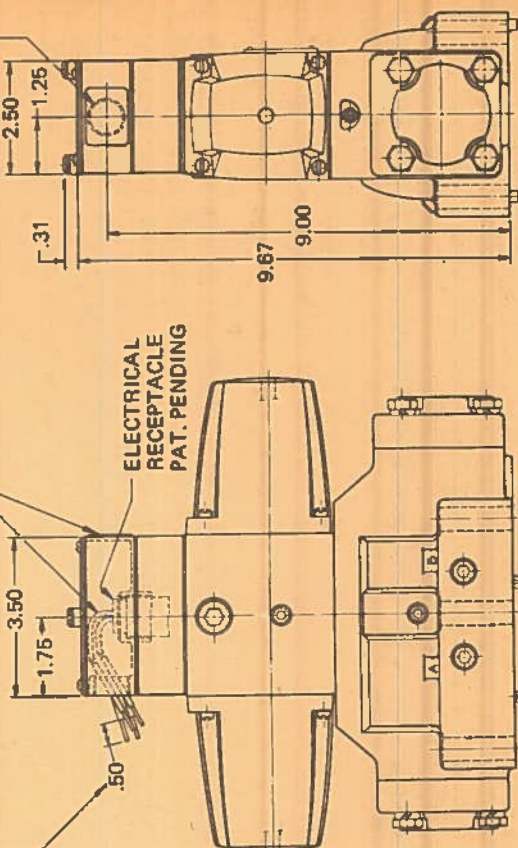
SOLENOIDS "A" AND "B" ARE IDENTIFIED ON THE PLUG  
RECEPTACLE CASTINGS AND CORRESPOND WITH  
SOLENOID IDENTIFICATION PLATE.



**MODEL PBDG5S4-06\*\*.\*.50**

4 LEADS APPROX. 7.00 LONG. WHITE LEADS ARE CONNECTED TO SOLENOID "A" AND BLACK LEADS ARE CONNECTED TO SOLENOID "B" (SEE DIAGRAM PLATE). FOR TYPE 4 SPOOL, 8 SPOOL AND LH MODELS CONDUIT CONNECTION LOCATION IS REVERSED. [ ] WARNING PL

**WARNING PLATE - ELECTRICAL POWER  
MUST BE DISCONNECTED BEFORE  
REMOVING OR REPLACING THIS  
RECEPTACLE (SEE GROUNDING NOTE)  
ELECTRICAL CONDUIT  
CONN. - 1/2 NPTF THD.**





# **OPTIONAL FEATURES**

**PRESSURE CENTERED VALVES:** THIS OPTION PROVIDES MORE POSITIVE CENTERING THROUGH GREATER FORCE. CENTERING SPRINGS ARE USED, IN ADDITION TO PILOT PRESSURE, TO ENSURE CENTERING (FLOW MUST BE WITHIN THE SPRING CENTERED RATINGS) SHOULD PILOT PRESSURE FAIL. SPRINGS CAN BE REMOVED BY THE USER IF NOT WANTED. PRESSURE CENTERED MODELS REQUIRE A MINIMUM OF 150 PSI FOR PILOT PRESSURE. THIS PRESSURE IS NOT AVAILABLE THROUGH USE OF AN INTEGRAL CHECK VALVE. (SEE DRAIN NOTE.)

THE FOLLOWING CHART PROVIDES CENTERING TIMES FOR FAST RESPONSE PRESSURE CENTERED MODELS. CENTERING TIMES FOR PRESSURE CENTERED MODELS ARE SHOWN WITH VARIOUS PILOT PRESSURES.

PRESSURE CENTERED VALVES (TYPICAL CENTERING TIMES IN SECONDS)	
PILOT PRESSURE (PSI)	"B" TO CENTER
150	.040
250	.030
500	.028
1000	.026
2000	.023
3000	.020
	"A" TO CENTER
	.075
	.068
	.040
	.032
	.028
	.024

**FAST RESPONSE:** USE OF THIS OPTION DECREASES THE SHIFT TIME AND INCREASES THE SYSTEM SHOCK GENERATION. AVAILABLE BY ADDING SYMBOL "X" TO MODEL NUMBER.  
EXAMPLE: DG5S4-062CX-51

TYPICAL SHIFT TIMES IN SECONDS FOR "ac" MODELS		
PILOT PRESSURE (PSI)	STANDARD CENTER TO "A" OR "B"	FAST RESPONSE CENTER TO "A" OR "B"
500	.080	.040
1000	.040	.030
2000	.030	.020
3000	.025	.015

ALL SPRING CENTERED MODELS REQUIRE APPROXIMATELY .075 OF A SECOND TO CENTER FROM EITHER SIDE.

"●" BECAUSE OF THE HIGH DRAIN LINE PRESSURE TRANSIENTS GENERATED DURING SHIFTING, USE OF THE FAST RESPONSE OPTION IS NOT RECOMMENDED FOR PILOT PRESSURES EXCEEDING 2000 PSI.

"ac" SHIFT TIMES WILL BE APPROXIMATELY THREE OR FOUR TIMES THE ABOVE "ac" VALUES. MAXIMUM CYCLING RATE (EACH ACTION ONCE, "ac" MODELS) APPROXIMATELY 100 CYCLES/MINUTE.

## **MODEL CODE**

SPECIAL SEALS (OMIT IF NOT REQUIRED). SEE FLUIDS AND SEALS NOTE.

X - SOLENOIDS FOR HAZARDOUS LOCATIONS.  
XM - SOLENOIDS FOR MINING APPLICATIONS. "X" OR "XM" NOT AVAILABLE ON PLUG-IN TYPE VALVES. (OMIT IF NOT REQUIRED.)

VALVES WITH INSTA-PLUG FEATURE (OMIT IF NOT REQUIRED.)  
INSTA-PLUG: "A" VALVE WITH PLUG ONLY  
"B" VALVE WITH PLUG AND RECEPTACLE

DIRECTIONAL CONTROL VALVE: SUBPLATE MOUNTING, SOLENOID CONTROLLED, PILOT OPERATED, SLIDING SPool, 4-WAY FLOW DIRECTION.

SOLENOID INDICATOR LIGHTS (OMIT IF NOT REQUIRED.)

VALVE SIZE

SPool TYPES: 0, 1, 2, 3, 4, 6, 8, 9, 33. SEE MODEL NUMBER TABULATION ON PAGE 3 FOR DESCRIPTION.

SPool SPRING ARRANGEMENT:

A - SPRING OFFSET  
C - SPRING CENTERED

D - PRESSURE CENTERED  
N - NO SPRING DETENTED

**INTEGRAL CHECK VALVES (IN PRESSURE PORT):** FOR PILOT PRESSURE - USE CHECK VALVE WITH 50 PSI CRACKING PRESSURE (R). IF INTERNAL PILOT VALVE DRAIN IS USED, THE PILOT PRESSURE IS DETERMINED FROM THE PRESSURE DROP THROUGH THE CHECK VALVE PLUS THE TOTAL PRESSURE DROP THROUGH THE VALVE (P→T) ON CENTER. IF EXTERNAL PILOT VALVE DRAIN IS USED, THE PILOT PRESSURE IS DETERMINED FROM THE PRESSURE DROP THROUGH THE CHECK VALVE PLUS THE TOTAL PRESSURE DROP THROUGH THE VALVE (P→T) PLUS OTHER PRESSURE DROPS DOWNSTREAM OF THE VALVE. FOR OTHER USES - A CHECK VALVE WITH 5 PSI CRACKING PRESSURE (K) CAN BE USED TO PREVENT REVERSE FLOW OTHER THAN LEAKAGE, SUCH AS IN CLAMP CIRCUITS, AND WHERE THE CHECK IS NOT REQUIRED FOR PILOT PRESSURE.

† NOTE: INTEGRAL CHECK VALVE MODELS "K" AND "R" ARE LIMITED FOR USE WITH ONLY THE 3/4" NPTF THREADED SUBPLATE (DGSM-06-50) WHERE THE THRU HOLES DO NOT EXCEED .906 DIA.

THE PRESSURE PORT IN THE CUSTOMERS MANIFOLD FOR THE SAME MODELS "K" AND "R" MUST ALSO BE LIMITED TO A MAXIMUM SIZE OF .906 DIA.

FLUIDS AND SEALS: THE USE OF SYNTHETIC, FIRE RESISTANT FLUIDS REQUIRES A VALVE WITH SPECIAL SEALS. ADD PREFIX "F3" TO MODEL NUMBER WHEN PHOSPHATE ESTERS TYPE FLUIDS OR ITS BLENDS ARE TO BE USED. WATER GLYCOL, WATER-IN-OIL EMULSION FLUIDS AND PETROLEUM OIL MAY BE USED WITH STANDARD SEALS. (SEE FLUID AND TEMPERATURE RECOMMENDATIONS DATA SHEET 1-286-S SECTION L.)

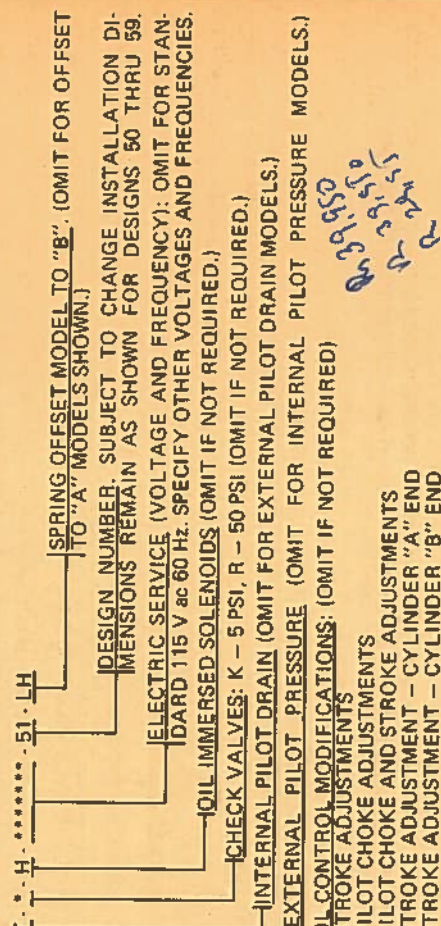
SOLENOID INDICATOR LIGHTS: LIGHTS ARE "ON" WHEN THERE IS CURRENT AT THE SOLENOIDS. ON SPRING OFFSET MODELS, LIGHT IS ON SOLENOID END ONLY. LIGHTS ARE AVAILABLE WITH SOLENOIDS RATED AT 100 THRU 125 VOLTS ONLY. NOT AVAILABLE FOR HAZARDOUS DUTY TYPE MODELS.

PLUG-IN VALVES: VALVES WITH INSTA-PLUG FEATURE ARE SHOWN ON PAGE 5.

**ELECTRICAL ACCESSORIES:** DATA ON THE WIRING HOUSING, CIRCUIT BREAKER AND TERMINAL STRIP ARE SHOWN ON THE DG4S4-01\*50 PILOT VALVE DRAWING 517401 IN THIS SECTION.

**GROUNDING:** THE WIRING CAVITY OF THE PILOT VALVE HAS A DRILLED HOLE FOR A NO. 8 SELF-TAPPING SCREW WHICH WILL PERMIT A GROUND WIRE TO BE SECURED TO THE PILOT VALVE BODY. A GROUND SYMBOL IS ADJACENT TO THIS HOLE.

THE INSTA PLUG RECEPTACLE (TOP SECTION) HAS A NO. 8-32 UNC-2B TAPPED HOLE AT THE BOTTOM FOR ATTACHING A GROUND CONNECTION. SEE DRAWING 517401 IN THIS SECTION (DG4S4-01\*50) FOR THE LOCATION OF THE GROUND CONNECTION IN OTHER ELECTRICAL ACCESSORIES.



FAST RESPONSE 51 DESIGN ONLY (OMIT FOR STANDARD MODELS.)  
● SEE DRAWING 517401 IN SECTION "D" FOR CODE OF ADDITIONAL ELECTRICAL ACCESSORIES.



# FLOW RATINGS

VALVE TYPE	SPOOL TYPE	RECOMMENDED FLOW CAPACITY	MAXIMUM FLOW WITHOUT MALFUNCTION
NO SPRING DETENTED	0, 2, 6 & 9 "◆"	45 GPM	100 GPM AT 3000 PSI
	0, 4 & 8		80 GPM AT 3000 PSI
	2, 3, 6 & 33 "◆"	45 GPM	100 GPM AT 3000 PSI
SPRING CENTERED	1	45 GPM	45 GPM AT 3000 PSI
	9	35 GPM	80 GPM AT 2000 PSI
	0, 2, 6 & 9 "◆"	45 GPM	35 GPM AT 3000 PSI
SPRING OFFSET	0, 1, 2, 3, 4, 6, 8, 9 & 33 "◆"	45 GPM	100 GPM AT 3000 PSI
PRESSURE CENTERED		45 GPM	100 GPM AT 3000 PSI

"◆" AS SYSTEM FLOW INCREASES THE MINIMUM PILOT PRESSURE REQUIRED INCREASES. THESE SPOOLS WILL OPERATE SATISFACTORILY IN EXCESS OF 100 GPM WITH HIGHER PILOT PRESSURES.

PSI PRESSURE DROP CHART - 45 GPM

SPOOL TYPE	FLOW PATH						
	P TO A	B TO T	P TO B	A TO T	CENTERED P TO T		
0	16	30	17	24	16		
1	21	40	18	23	23		
2	30	38	22	28			
3	30	38	26	23			
4	60	61	45	60	43		
6	34	30	26	23			
8	19	49	15	42	39		
9	18	31	17	23			
33	30	38	30	38	510		

- FIGURES IN PRESSURE DROP CHART GIVE APPROXIMATE PRESSURE DROPS ( $\Delta P$ ) WHEN PASSING 45 GPM FLOW (Q) OF 100 SUS FLUID(S) HAVING .865 SPECIFIC GRAVITY.
- FOR ANY OTHER FLOW RATE (Q1), THE PRESSURE DROP ( $\Delta P_1$ ) WILL BE APPROXIMATELY:  $\Delta P_1 = P(Q1/Q)^2$
- FOR ANY OTHER VISCOSITY (S), THE PRESSURE DROP ( $\Delta P$ ) WILL CHANGE AS FOLLOWS:

OTHER VISCOSITY (S)	75	150	200	250	300	350	400
% OF $\Delta P$ (APPROX.)	93	111	119	126	132	137	141

- FOR ANY OTHER SPECIFIC GRAVITY (G1), THE PRESSURE DROP ( $\Delta P_1$ ) WILL BE APPROXIMATELY:  $\Delta P_1 = \Delta P(G1/G)$

**SOLENOIDS**  
ELECTRIC SERVICE: SOLENOIDS ON MODELS LISTED ARE FOR 115 V ac - 60 Hz SERVICE. SPECIFY IN MODEL NUMBER IF OTHER THAN 115 V ac - 60 Hz SERVICE IS DESIRED. SEE MODEL CODE. SPERRY VICKERS "ac" SOLENOIDS ARE CLASS "A".

SOLENOID CURRENT APPROX. MAXIMUM	INRUSH AMPS	HOLDING AMPS	HOLDING WATTS
115 V ac - 60 Hz	5.1	.61	
115 V ac - 50/60 Hz	(50) 3.25 (60) 4.97	(50) .56 (60) .59	
230 V ac - 60 Hz	2.55	.32	
460 V ac - 60 Hz	1.27	.16	
6 V dc			24
12 V dc			24
24 V dc			24

SHIFTING ACTION: SPRING CENTERED, PRESSURE CENTERED AND SPRING OFFSET MODELS MUST BE ENERGIZED CONTINUOUSLY. DETENTED NO SPRING MODELS MAY BE ENERGIZED MOMENTARILY APPROXIMATELY 0.1 SECOND. PRESSURE CENTERED AND SPRING CENTERED MODELS RETURN VALVE SPOOL TO CENTER POSITION WHEN BOTH SOLENOIDS ARE DE-ENERGIZED. SPRING OFFSET MODELS RETURN SPOOL TO OFFSET POSITION BY PILOT PRESSURE WHEN SOLENOID IS DE-ENERGIZED.

WHEN NO SPRING DETENTED MODELS ARE DE-ENERGIZED, THE PILOT AND MAIN SPOOLS REMAIN IN THE LAST POSITION ATTAINED, PROVIDED THERE IS NO SHOCK, VIBRATION, UNUSUAL PRESSURE TRANSIENTS AND THE SPOOL AXIS IS HORIZONTAL. IF PILOT PRESSURE FAILS OR FALLS BELOW THE MINIMUM, THE MAIN SPOOL WILL SPRING CENTER (AT SPRING CENTERED FLOW RATES) AND CANNOT DRIFT TO REVERSAL OF FLOW (PILOT STAGE REMAINS IN DETENTED POSITION). CAUTION: BECAUSE OF THIS, THE FLOW CONDITIONS OF THE SPRING CENTERED POSITION MUST BE SELECTED WITH CARE, BOTH FOR THE EFFECT ON THE DIRECTION OF THE FLOW, AND THE PILOT PRESSURE. (THE "9" MAIN SPOOL WILL NOT ENSURE SUFFICIENT PILOT PRESSURE IN THE CENTER POSITION.)

NOTE: ANY SLIDING SPOOL VALVE, IF HELD SHIFTED UNDER PRESSURE FOR LONG PERIODS OF TIME, MAY STICK AND NOT SPRING RETURN DUE TO FLUID RESIDUE FORMATION AND, THEREFORE, SHOULD BE CYCLED PERIODICALLY TO PREVENT THIS FROM HAPPENING.

WHEN USED AS OTHER THAN A NORMAL 4-WAY VALVE, CONSULT YOUR SPERRY VICKERS REPRESENTATIVE.

NOTE: SURGES OF OIL IN A COMMON PILOT VALVE DRAIN LINE, SERVING TWO OR MORE PILOT OPERATED 4-WAY VALVES, CAN BE OF SUFFICIENT MAGNITUDE TO CAUSE INADVERTENT SHIFTING OF THESE VALVES. THIS IS PARTICULARLY CRITICAL IN THE NO SPRING DETENTED TYPE VALVES. SEPARATE DRAIN LINES OR A VENTED DRAIN MANIFOLD WITH A CONTINUOUS DOWNWARD PATH TO TANK IS NECESSARY.

## DRAINS

1. PILOT VALVE DRAIN:  
INTERNAL PILOT PRESSURE OF INTERNALLY DRAINED VALVES MUST ALWAYS EXCEED TANK LINE BACK PRESSURE BY A MINIMUM OF 75 PSI FOR SPOOL TYPES "0", "1", "4", "8", & "9" AND A MINIMUM OF 150 PSI FOR ALL OTHER SPOOLS. IS REQUIRED TO PROVIDE MAXIMUM FLOW WITHOUT MALFUNCTION. INTERNALLY DRAINED VALVES MAY BE USED ONLY WHEN SURGES IN THE TANK LINE CANNOT POSSIBLY OVERCOME THIS DIFFERENTIAL. INTERNAL DRAIN MAY BE USED WITH ALL VALVES. HOWEVER, A-50 PSI INTEGRAL PRESSURE PORT CHECK VALVE (R) (SEE OPTIONAL CHECK VALVE NOTE) IS REQUIRED FOR VALVES USING AN INTERNAL PILOT SOURCE WITH AN OPEN CENTER SPOOL (0, 1, 4, 8 AND 9 TYPES) IN ORDER TO MAINTAIN PILOT PRESSURE. IF AN EXTERNAL PILOT SOURCE IS USED THEN "R" IS NOT REQUIRED. WHEN INTERNAL PILOT DRAIN IS REQUIRED, ORDER ACCORDING TO MODEL CODE. (PRESSURE CENTERED VALVES NOT AVAILABLE WITH INTERNAL PILOT DRAIN. DRAINS "Y" AND "W" MUST BE USED).

EXTERNAL: WHEN THE POSSIBILITY OF PRESSURE SURGES IN THE TANK LINE EXISTS, EXTERNALLY DRAINED VALVES ARE RECOMMENDED. FOR EXTERNALLY DRAINED MODELS, THE PILOT VALVE DRAIN LINE MUST BE PIPED DIRECTLY TO TANK THROUGH A SURGE FREE LINE SO THERE WILL BE NO BACK PRESSURE AT THIS DRAIN. (REFERENCE CONNECTION "Y")

2. PRESSURE CENTERED DRAINS PORT "W" AND "Y"  
EXTERNAL ONLY. CONNECT DIRECTLY TO THE RESERVOIR THRU A SURGE FREE LINE SO THERE WILL BE NO BACK PRESSURE AT THIS DRAIN. "Y" DRAIN ALSO EXTERNAL ONLY. SEE ABOVE.

FILTRATION RECOMMENDED. . . . . 25 MICRON

## MOUNTING

POSITION: NO SPRING DETENTED MODELS MUST BE INSTALLED WITH THE LONGITUDINAL AXIS HORIZONTAL FOR GOOD MACHINE RELIABILITY. MOUNTING POSITION OF SPRING OFFSET AND SPRING CENTERED MODELS IS UNRESTRICTED PROVIDED THAT THE PILOT PRESSURE SUPPLY IS MAINTAINED AS REQUIRED. (SPRING OFFSET VALVES DO NOT HAVE A SPRING IN THE MAIN SPOOL SECTION.) SUBPLATES AND BOLT KITS (ALSO SEE NOTE UNDER INTEGRAL CHECK VALVE OPTION) VALVES, SUBPLATES AND MOUNTING BOLTS MUST BE ORDERED SEPARATELY. EXAMPLE: ONE (1) DGS54-062C-51 VALVE ONE (1) 8KDG06 635 BOLT KIT ONE (1) DGS06-50 SUBPLATE

MAXIMUM RECOMMENDED MOUNTING BOLT TORQUE. . . . . 700 IN. LBS.

NOTE: CENTER MOUNTING BOLTS (2) ARE OPTIONAL. ALL SIX BOLTS ARE RECOMMENDED FOR PRESSURE RANGE OF 2000 TO 3000 PSI FOR MAXIMUM SEAL LIFE. WHEN SUBPLATE IS NOT USED, A MACHINED PAD (AS INDICATED BY SUBPLATE SHADED AREA) MUST BE PROVIDED FOR MOUNTING; PAD MUST BE FLAT WITHIN .0005 INCH AND SMOOTH WITHIN 63 MICRONS. MOUNTING BOLTS, WHEN PROVIDED BY CUSTOMER, SHOULD BE SAE GRADE 7, OR BETTER.

517900A-3



MODEL NUMBER				SPOOL TYPE		DIRECTION OF OIL FLOW FOR VALVE SPOOL POSITIONS	
DOUBLE SOLENOID				SINGLE SOLENOID	SPOOL TYPE	CENTER-APPLIES TO: 1. SPRING OR PRESSURE CENTERED MODELS DE-ENERGIZED. 2. ALL OTHER MODELS AT CENTER CROSS OVER.	SEE NOTE "■" SOLENOID "A" IS ENERGIZED OR WHEN SPRING OFFSET
NO-SPRING DETENTED	SPRING CENTERED	PRESSURE CENTERED					
DG554-060N-5*	DG554-060C-5*	DG554-060D-5*	DG554-060A-5*		"0"-OPEN CENTER ALL PORTS	PR, CYL. A & CYL. B → TANK	SEE NOTE "■" SOLENOID "A" IS ENERGIZED OR WHEN SPRING OFFSET
	DG554-061C-5*	DG554-061D-5*			"1"-OPEN CENTER P & A	PR, CYL. A → TANK CYL. B, BLOCKED	
DG554-062N-5*	DG554-062C-5*	DG554-062D-5*	DG554-062A-5*		"2"-CLOSED CENTER ALL PORTS	PR, CYL. A & CYL. B BLOCKED	PR. → CYL. "A" CYL. "B" → TANK PR. → CYL. "B" CYL. "A" → TANK
	DG554-063C-5*	DG554-063D-5*			"3"-CLOSED CENTER P & B	PR. & CYL. B BLOCKED CYL. A → TANK	
	DG554-064C-5*	DG554-064D-5*			"4"-TANDEM CLOSED CROSS OVER	PR. → TANK CYL. A & CYL. B BLOCKED	
DG554-066N-5*	DG554-066C-5*	DG554-066D-5*	DG554-066A-5*		"6"-CLOSED CENTER P ONLY	PR. BLOCKED CYL. A & CYL. B → TANK	
	DG554-068C-5*	DG554-068D-5*			"8"-TANDEM OPEN CROSS OVER	PR. → TANK CYL. A & CYL. B BLOCKED	
"DG554-069N-5"	DG554-069C-5*	DG554-069D-5*	DG554-069A-5*		"9"-OPEN CENTER PARTIAL-ALL PORTS	PR, CYL. A & CYL. B → TANK	
	DG554-0633C-5*	DG554-0633D-5*			"33"-CLOSED CENTER BLEED A & B	PR. - BLOCKED CYL. A & CYL. B → TANK	

● SEE PILOT PRESSURE AND SHIFTING ACTION NOTES.

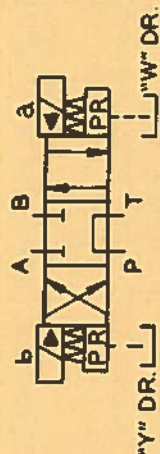
"■" SOLENOIDS "A" AND "B" ARE IDENTIFIED ON UNIT BY DIAGRAM PLATE ON SIDE OF PILOT VALVE.

→ FULL FLOW  
✗ RESTRICTED FLOW

### TYPICAL GRAPHICAL SLIDING SPOOL SYMBOLS



SPRING CENTERED



PRESSURE CENTERED



NO SPRING DETENTED



SPRING OFFSET

### PILOT PRESSURE:

MAXIMUM. 75 PSI IS REQUIRED FOR ALL SPOOLS AT ZERO FLOW. FOR MAXIMUM FLOW WITHOUT MALFUNCTION, 75 PSI IS REQUIRED FOR OPEN CENTER SPOOLS (0, 1, 4, 8 & 9) AND 150 PSI IS REQUIRED FOR CLOSED CENTER SPOOLS (2, 3, 6 & 33).

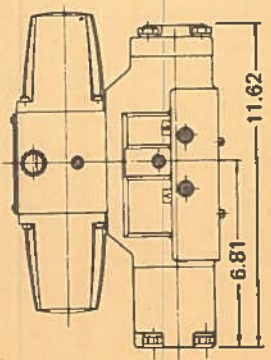
NOTE: THE PILOT PRESSURE SOURCE IN MODELS TABULATED IS CONNECTED INTERNALLY WITH PRESSURE INLET CONNECTION AND IS EQUAL TO PRESSURE AT PRESSURE PORT. WITH MODELS HAVING PRESSURE OPEN OR PARTIALLY OPEN TO TANK AT CENTER POSITION, PILOT PRESSURE CAN BE ASSURED BY IMPOSING A BACK PRESSURE OF AT LEAST THE REQUIRED MINIMUM PILOT PRESSURE AT THE TANK OUTLET CONNECTION (THIS BACK PRESSURE WILL BE PRESENT AT CYLINDER PORTS IF SPOOL IS "0", "1" OR "9" TYPE).

CAUTION: PRESSURE CENTERED MODELS REQUIRE A MINIMUM OF 150 PSI FOR PILOT PRESSURE.

WHEN PILOT PRESSURE FROM SEPARATE SOURCE (EXTERNAL) IS REQUIRED, AN EXTERNAL CONNECTION CAN BE PROVIDED. ORDER ACCORDING TO MODEL CODE.

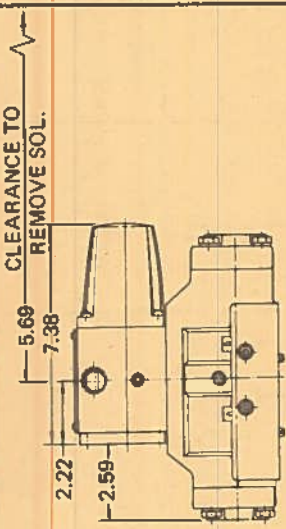


**PRESSURE CENTERED MODELS**



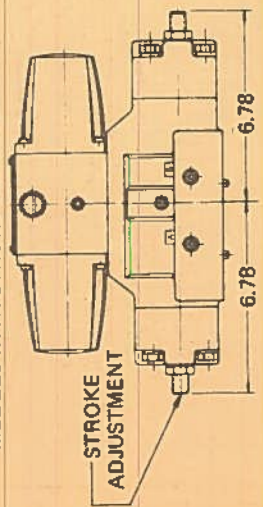
WEIGHT (APPROX.) 42 LBS

**SINGLE SOLENOID - SPRING OFFSET MODELS**



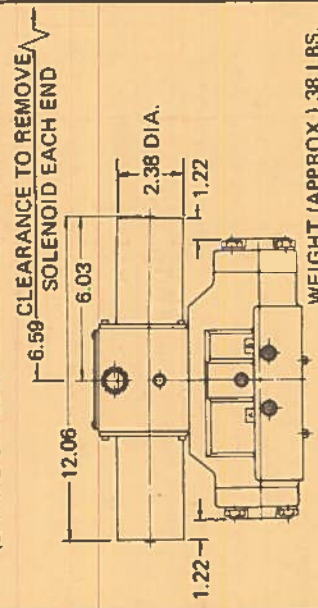
SPRING OFFSET MODEL - WHEN SOLENOID IS DE-ENERGIZED, THE SPOOL IS RETURNED TO THE OFFSET POSITION BY PILOT PRESSURE. THERE IS NO SPRING IN THE MAIN VALVE SECTION.  
WEIGHT (APPROX.) 34 LBS.

**MODELS WITH STROKE ADJUSTMENTS**



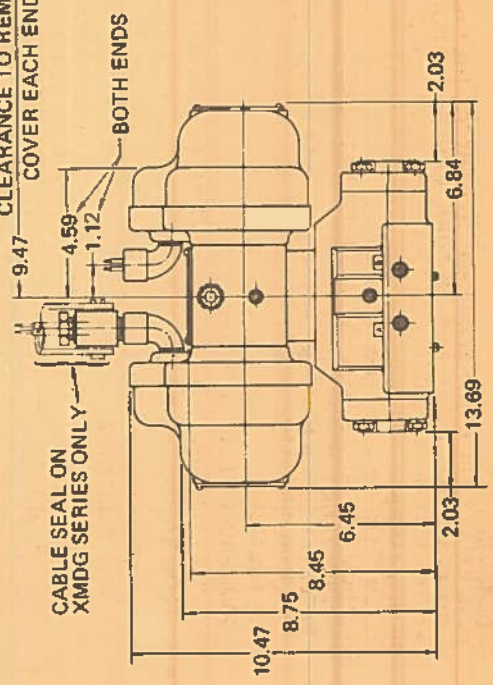
STROKE ADJUSTMENTS LIMIT MOVEMENT OF MAIN STAGE SPOOL. (BACKING OFF JAM NUT AND TURNING ADJUSTING SCREW IN SHORTENS SPOOL STROKE.)  
WEIGHT (APPROX.) 46 LBS.

**MODELS WITH DC SOLENOIDS (DOUBLE) NO SPRING DETENTED AND SPRING-CENTERED TYPES (SPRING OFFSET MODELS ALSO AVAILABLE)**



WEIGHT (APPROX.) 38 LBS.

**CLEARANCE TO REMOVE COVER EACH END**

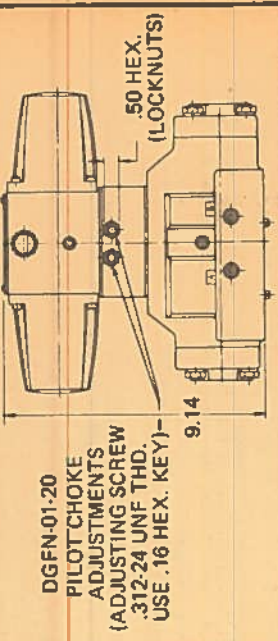


**NO SPRING DETENTED AND SPRING CENTERED VALVES FOR HAZARDOUS LOCATIONS AND MINING APPLICATIONS (SPRING OFFSET MODELS ALSO AVAILABLE)**

VALVES HAVE "UL LISTED" SOLENOIDS FOR USE IN HAZARDOUS LOCATIONS - CLASS I GROUP D, CLASS II GROUP E-F-G, FOR 115 AND 230 V ac, 60 Hz SERVICE.  
VALVES FOR MINING APPLICATIONS ARE BUILT TO MESA SCHEDULE 2G - FILE X/P 837-3. AVAILABLE IN ALL STANDARD VOLTAGES.

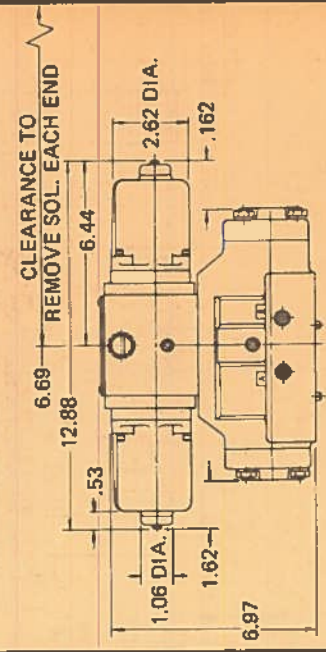
WEIGHT (APPROX.) 42 LBS.

**MODELS WITH PILOT CHOKE ADJUSTMENTS**



PILOT CHOKE ADJUSTED BY BACKING OFF LOCKNUTS AND TURNING ADJUSTING SCREWS OUT TO SLOW DOWN RATE OF SPOOL TRAVEL AND IN TO INCREASE THIS RATE. PILOT OIL FOR MODELS WITH THIS FEATURE SHOULD BE TAKEN FROM A SOURCE HAVING CONSTANT PRESSURE.  
WEIGHT (APPROX.) 42 LBS.

**MODELS WITH OIL IMMERSIBLE SOLENOIDS (DOUBLE) NO SPRING DETENTED AND SPRING CENTERED TYPES (SPRING OFFSET MODELS ALSO AVAILABLE)**



WEIGHT (APPROX.) 39 LBS.



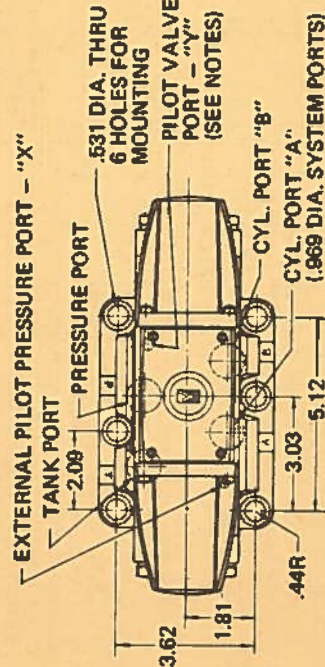
**SPERRY VICKERS**  
TROY, MICHIGAN 48064

# GENERAL USAGE

THESE VALVES ARE GENERALLY USED TO CONTROL THE DIRECTION OF FLOW IN A HYDRAULIC CIRCUIT. THIS, IN TURN, WOULD CONTROL THE DIRECTION OF MOVEMENT OF A FLUID CYLINDER, OR THE ROTATION OF A FLUID MOTOR.

## SPECIFICATIONS

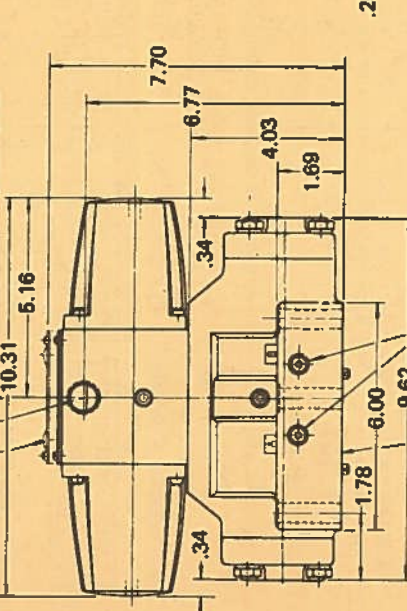
SYSTEM PRESSURE AND FLOW  
MAXIMUM OPERATING PRESSURE (SEE FLOW RATINGS)..... 3000 PSI  
MAXIMUM TANK LINE PRESSURE:  
EXTERNAL DRAIN MODELS..... 3000 PSI  
INTERNAL DRAIN MODELS..... 1000 PSI  
PILOT PRESSURE..... (SEE NOTES)  
RECOMMENDED FLOW AT 3000 PSI..... ♦ TO 45 GPM  
MAXIMUM FLOW AND PRESSURE WITHOUT MALFUNCTION..... ♦ TO 100 GPM  
♦ SEE FLOW RATINGS PAGE 3.



(SEE GROUND NOTE AND ELECTRICAL ACCESSORIES DATA PAGE 4)

ELECTRICAL CONDUIT CONN. 1/2 NPTF THD. (ALTERNATE CONN. ON OPPOSITE SIDE)

INDICATOR LIGHTS - 5.89 SOLENOID - EACH END  
CLEARANCE TO REMOVE



TEST CONNECTIONS 1/4 NPTF

MOUNTING SURFACE (SEALS FURNISHED)

DOUBLE SOLENOID NO-SPRING DETENTED AND SPRING CENTERED MODELS  
WEIGHT LBS. (APPROX.) 36

REVISED 6-1-77

**SPERRY VICKERS**

# SOLENOID CONTROLLED - PILOT OPERATED FOUR-WAY DIRECTIONAL VALVES

MODEL SERIES DG5S4-06\*8\*  
MANIFOLD OR SUBPLATE MOUNTING

## MOUNTING SUBPLATES

4.38 DIA. THRU 1/4 NPTF THD. (FROM REAR)  
"W" DRAIN CONN. (FOR "D" PRESSURE CENTERED MODELS ONLY) (SUBPLATES NOT AVAILABLE)

500-13 UNC-28 THD. 6 HOLES  
PRESS. INLET CONN. TANK CONN.

8.00  
5.44  
4.72  
4.03  
2.16  
1.22

2.81 DIA. .31 DEEP 2 HOLES (FOR REST PINS)  
"Y" - PILOT VALVE DRAIN CONN. (NOT REQ'D FOR INTER-NALLY DRAINED MODELS)

406 DIA. .4 HOLES FOR MOUNTING

3.81  
2.88  
.69  
4.4 R.  
CYL. CONN. "B"

"F" DIA. THRU 4 HOLES "E" NPTF THD. (FROM REAR)  
† FOR "06Y" SUB-PLATE WITH 1/4 NPTF PORTS. SEE DRAWING 522680 SECTION L.

1.69  
3.06  
4.97  
6.12  
7.12  
CYL. CONN. "A"

"X" - EXTERNAL PILOT PRESS. CONN. 4.38 DIA. THRU 1/4 NPTF (FROM REAR) 2 HOLES

3.62  
2.94  
1.81  
.75  
1.00

1.00

1.00

1.00

1.00

1.00

1.00

1.00

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1.00

MODEL NUMBER	† "E" NPTF THREAD	"F" DIA.	WEIGHT (APPROX.)
DGSM-06-50	3/4"	.906	11 LBS.
DGSM-06X-50	1"	.969	

PIPE THREADED. SIDE CONNECTION SUB-PLATES ALSO AVAILABLE WITH 3/4 & 1" NPTF THDS.  
▲ SUBPLATES DGSM-06-50 & DGSM-06X-50 HAVE NO "W" DRAIN CONNECTION.

517900A



**Integral Check Valves** (In Pressure Port) for open center spools using internal pilot pressure and internal pilot drain select appropriate spring model (K, L, R or S) from "check valve pressure drop vs. flow" curve shown page 4. Total pressure drop required is 75 psi, therefore, determine valve  $\Delta P$  (P to T) at the actual application flow rate. Subtract this value from 75 psi and call its value "C". Refer to the "check valve pressure drop" curve at the application flow rate and select the spring model letter whose curve is above the psi value "C". (See "pilot pressure" note for external drain models.) (Minimum pilot pressure for "g" spool DG5S4-H06 is 85 psi).

**Example:**

Model selected — DG5S4-H060C-T-M-W\*51 and flow in neutral 20 GPM. — Assuming no pressure or pressure surges in the tank line. To select proper integral check valve consider:

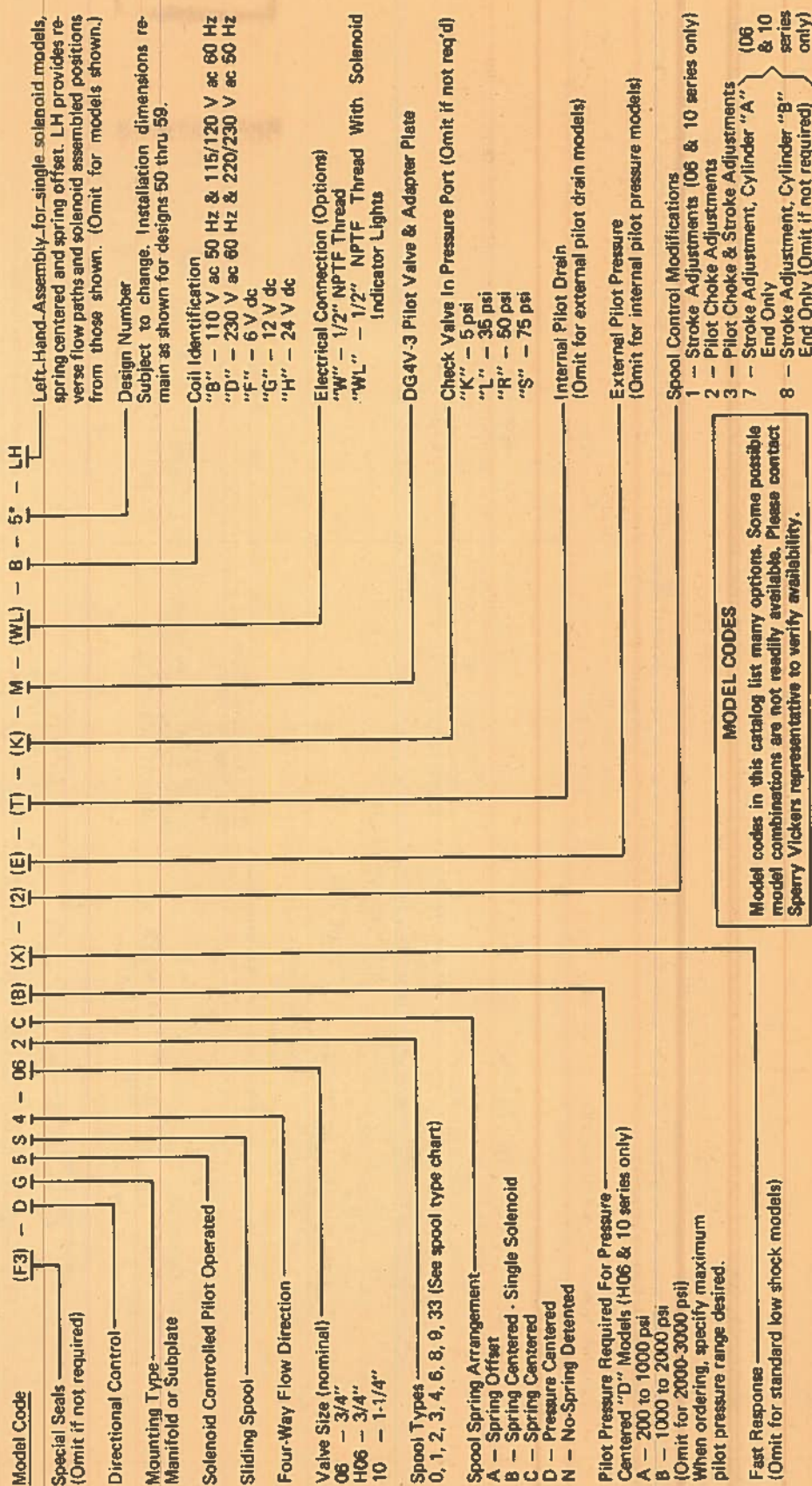
$$\Delta P (P \rightarrow T) \text{ from chart} = \text{approx. } 35 \text{ psi at } 80 \text{ GPM}$$

$$\Delta P \text{ at } 20 \text{ GPM} = 35 \text{ psi} \left( \frac{20}{80} \right)^2 = 2 \text{ psi}$$

75 psi — 2 psi = 73 psi additional pilot pressure to be obtained thru integral check valve. Value "C".

From check valve pressure drop curves for DG5S4-H06 series at 20 GPM, 73 psi is generated between the R and S check valves.

Select "S" for DG5S4-H060C-T-S-M-W\*51.



**Note:** (For 06 only) Integral check valve models "K" and "R" are limited for use with only the 3/4" NPTF threaded subplate (DGSM-06-50) where the thru holes do not exceed .906 dia. The pressure port in the customers manifold for the same models "K" and "R" must also be limited to a maximum size of .906 dia.

**Solenoid Indicator Light(s):** Light is "on" when there is current at the solenoids. Lights are available with B & D solenoids. Add 7 (.28) to valve height.

**Fluids and Seals:** The use of synthetic, fire-resistant fluids requires a valve with special seals. Add prefix "F3" to model number when phosphate esters type fluids or its blends are to be used. Water glycol, water-in-oil emulsion fluids and petroleum oil may be used with standard seals. (See fluid and temperature recommendations data sheet I-286-S.

**Note:** Pilot valve has F3 seals as standard.



**Pressure centered models:** Valve spool is returned to center position by pilot pressure, when both solenoids are de-energized. If pilot pressure fails or falls below the required minimum, the valve spool will spring return the center position. (At spring centered valve flow rates.)

**Note:** Any sliding spool valve, if held shifted under pressure for long periods of time, may stick and not spring return due to fluid residue formation and, therefore, should be cycled periodically to prevent this from happening.

**When used as other than a normal 4-way valve, consult your Sperry Vickers representative.**

**Note:** Surges of oil in a common pilot valve drain line, serving two or more pilot operated 4-way valves, can be of sufficient magnitude to cause inadvertent shifting of these valves. This is particularly critical in the no-spring detented type valves. Separate drain lines or a vented drain manifold with a continuous downward path to tank is necessary.

#### Drains

1. **Pilot Valve Drain:** (For max. ratings see page 1).

**Internal:** Pilot pressure of internally drained valves must always exceed tank line back pressure by the required minimum. Internally drained valves may be used only when surges in the tank line cannot possibly overcome this differential. Internal drain may be used with all valves, however, an integral pressure port check valve (see optional check valve note) is required for valves using an internal pilot source with an open center spool (0, 1, 4, 8 and 9 types) in order to maintain pilot pressure. If an external pilot source is used then the check valve is not required. When internal pilot drain is required, order according to model code. (Pressure centered valves not available with internal pilot drain. Drains "Y" and "W" must be used).

**External:** When the possibility of pressure surges in the tank line exists, externally drained valves are recommended. For externally drained models, the pilot valve drain line must be piped directly to tank through a surge free line so there will be no back pressure at this drain. (Reference connection "Y".)

2. **Pressure centered drains port "W" and "Y"**

**External only.** Connect directly to the reservoir thru a surge free line so there will be no back pressure at this drain. "Y" drain also external only. See above.

**Filtration Required.** ..... 35 Micron Absolute or Less

#### Mounting

**Position:** No-spring detented models must be installed with the longitudinal axis horizontal for good machine reliability. Mounting position of spring offset and spring centered models is unrestricted provided that the pilot pressure supply is maintained as required. (Spring offset valves do not have a spring in the main spool section.)

**Subplates and Bolt Kits** (Also see note under Integral Check Valve Option)

Valves, subplates and mounting bolts must be ordered separately.

Examples:

Valve	Subplate	Bolt Kit
One (1) DG5S4-062C-M-W-5*	One (1) DGSM-06-5*	One (1) BKDG06-635
One (1) DG5S4-H062C-M-W-5*	One (1) DGSM-06-Y-5*	One (1) BKDG06-618
One (1) DG5S4-102C-M-W-5*	One (1) DGSM-10-1* (see alternates)	One (1) BKDG10-636

**Maximum Recommended Mounting Bolt Torque** (06 & H06 Series). ..... 700 Lb. In.  
(10 Series). ..... 210 Lb. Ft.

Adapter Plates DGAM-06-5\* and for pressure centered models DGAM-06-D-5\* with "W" drain are available to adapt the DG5S4-H06\*\*5\* series to present DG5S4-10\*\*5\* series installations. (See graphics.)

**Note:** for 06 and H06: Center mounting bolts (2) are optional. All six bolts are recommended for pressure range of 2000 to 3000 psi for maximum seal life.

When subplate is not used, a machined pad (as indicated by subplate shaded area) must be provided for mounting; pad must be flat within .0005 inch and smooth within 63 microinch. Mounting bolts, when provided by customer, should be SAE grade 7, or better.

#### Optional Features

**Pressure centered valves:** This option provides more positive centering through greater force. Centering springs are used, in addition to pilot pressure, to ensure centering (flow must be within the spring centered ratings) should pilot pressure fail. Springs can be removed by the user if not wanted. Pressure centered models require a minimum of 150  $\Delta$  psi for pilot pressure. This pressure is not available through use of an integral check valve. (See drain note.)

**Fast Response:** Use of this option decreases the shift time and increases the system shock generation. Available by adding symbol "X" to model number. Example: DG5S4-062C-X-51

Pilot Pressure (psi)	Typical Shift Times in Seconds For ac Models					
	Standard			Fast Response		
	Center to "A" or "B"			Center to "A" or "B"		
	Model 06	Model H06	Model 100	Model 06	Model H06	Model 100
500	.100	.130	.135	.045	.070	.090
1000	.060	.085	.090	.035	.060	.060
2000	.050	.070	.070	.035	.060	.050
3000	.050	.070	.055	.035	.060	.050

All spring centered models require approximately .08 (06), .15 (H06), .19 (100) of a second to center from either side.

dc shift times will be approximately three or four times the above ac values.



# BASIC SPECIFICATIONS DG5S4-H06 AND 10 SERIES

## Model Series DG5S4-H06\*

Spool Type	Minimum Pilot Pressure-psi			
	Flow GPM	Shifting P → A	Shifting P → B	
0, 2, 3, 4, 6, 8 & 33 9	0	Pressure Centered Models	Pressure Centered Models	All Other Models
		75	200	75
		85	210	85
0, 4, 8 & 8 160	160	75	200	75
		150	400	150

▲ Spring offset models 150 psi.

● On pressure centered models end covers cannot be interchanged. Pilot pressure is not available through use of integral check valve.

## Model Series DG5S4-10\*

Spool Type	Minimum Pilot Pressure psi			
	Flow GPM	Shifting P → A	Shifting P → B	
All Spools	0	Pressure Centered Models	Pressure Centered Models	All Other Models
		75	200	75
		150	400	150
0, 4, 8 & 9 250	250	75	200	75
		150	400	150

● See above.

## Flow Ratings - Model Series DG5S4-H06\*

Valve Type	Spool Type	Recommended Flow Capacity	Maximum Flow Without Malfunction
No-Spring Detented	0, 2, 6, 9 & 33	80 GPM	160 GPM @ 3000 psi
Spring Centered	2, 3, 6, 33		
	0, 4, 8		
	9		
Spring Offset	0, 2, 6, 9 & 33	100 GPM @ 2000 psi	160 GPM @ 3000 psi
Pressure Centered	0, 2, 3, 4, 6, 8 & 33		
	9	100 GPM @ 3000 psi	

■ As system flow increases the minimum pilot pressure required increases. These spools will operate satisfactorily in excess of 160 GPM with higher pilot pressure. All spools in pressure centered models will operate satisfactorily in excess of GPM shown with higher pilot pressure.

## Flow Ratings - Model Series DG5S4-10\*

Valve Type	Spool Type	Recommended Flow Capacity	Maximum Flow Without Malfunction
No-Spring Detented	0, 2, 6, 9 & 33	125 GPM	250 GPM @ 3000 psi
	0, 4, 8		
	2, 3, 6 & 33		
Spring Centered	9	86 GPM	125 GPM @ 3000 psi
Spring Offset Pressure Centered	0, 2, 6, 9 & 33	125 GPM	250 GPM @ 3000 psi
	0, 2, 3, 4, 6, 8, 9 & 33		

■ As system flow increases the minimum pilot pressure required increases. These spools will operate satisfactorily in excess of 250 GPM with higher pilot pressure.

## GENERAL NOTES ALL VALVES

Solenoid Voltage Rating	Identification Letter	Inrush amps (R.M.S.)	Holding amps	Holding watts
115/120 V ac 60 Hz	B	2.0	.4	26
110 V ac 50 Hz				
230 V ac 60 Hz	D	1.0	.2	26
220/230 V ac 50 Hz				
12 V dc	G	-	2.2	26
24 V dc	H	-	1.1	26

● Maximum peak inrush amps approximately 1.4 x R.M.S. value shown.

## Pilot Pressure

Note: The pilot pressure stated is based on internally piloted and externally drained models in which the pilot pressure is equal to pressure at pressure port. With models having flow open or partially open to tank at center position, pilot pressure can be assured by imposing a back pressure of at least the required minimum pilot pressure at the tank outlet connection. (This back pressure will be present at cylinder ports if spool is "0" or "g" type) or an integral check valve can be supplied which will not impose the additional pressure at the cylinder ports. (Selection method is outlined in "integral check valve" note and can be followed to select the proper spring model.)

When pilot pressure from separate source (external) is required, an external connection can be provided. Order according to model code.

## Electrical Connection

A 1/2 NPT thread electrical connection to the valve is made in the electrical wiring housing. This housing can be rotated 180° from position shown.

Two lead wires for each solenoid approximately 153.0 (6.00) long with M3 (No. 6) size terminals provided for customer connection.

A No. 8-32 screw for a ground connection is also provided in the wiring housing.

The conduit connection readily adapts to connector-receptacle assemblies on the market. Models including these are available.

Shifting Action: Spring centered, pressure centered and spring offset models must be energized continuously to maintain shifted position. Detented no-spring models may be energized momentarily approximately 0.1 second but continuous energization is recommended to prevent valve reversal. Pressure centered and spring centered models return valve spool to center position when both solenoids are de-energized. Spring offset models return spool to offset position by pilot pressure when solenoid is de-energized.

When no-spring detented models are de-energized, the pilot and main spools remain in the last position attained, provided there is no shock, vibration, unusual pressure transients and the spool axis is horizontal. If pilot pressure fails or falls below the minimum, the main spool will spring center (at spring centered flow rates) and cannot drift to reversal of flow (pilot stage remains in detented position). Caution: Because of this, the flow conditions of the spring centered position must be selected with care, both for the effect on the direction of the flow, and the pilot pressure. (The "g" main spool will not ensure sufficient pilot pressure in the center position.)



## SPOOL TYPES AND MODEL COMBINATIONS - PRESSURE DROP DATA (APPROX.)

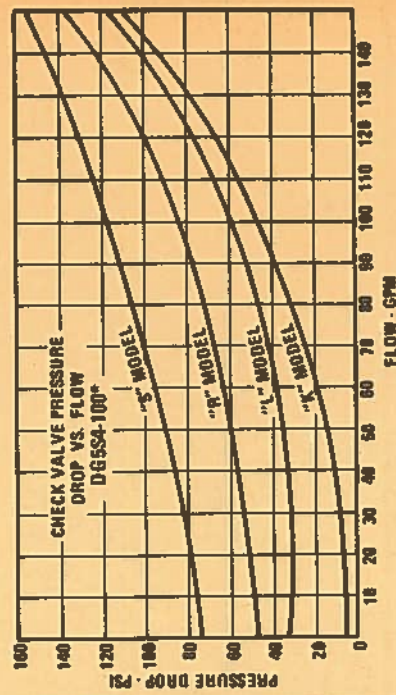
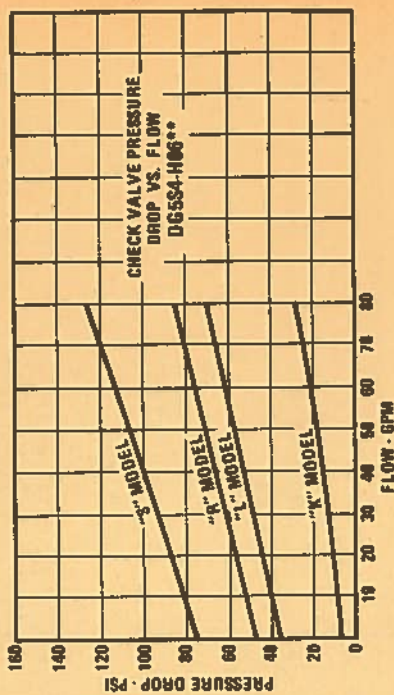
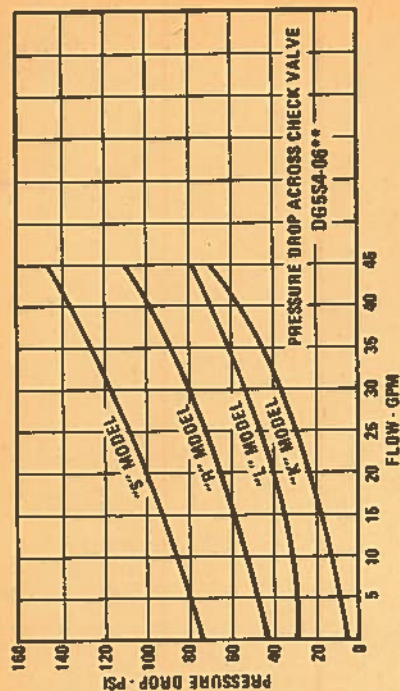
Spool Type	Center Position	Description	Flow Path												Centered P to T		
			P to A			B to T			P to B			A to T					
			06	H06	10	06	H06	10	06	H06	10	06	H06	10	06	H06	10
0		Open Center – All Ports	16	30	45	30	38	73	17	30	51	24	45	65	16	35	55
1		Open Center – P & A	21	—	—	40	—	—	18	—	—	23	—	—	23	—	—
2		Closed Center – All Ports	30	28	55	38	45	83	22	40	55	28	37	76	—	—	—
3		Closed Center – P & B	30	28	55	38	45	83	26	40	55	23	37	48	—	—	—
4		Tandem – Closed Crossover	60	35	80	61	60	150	45	60	80	60	37	170	43	50	80
6		Closed Center – P Only	34	28	55	30	38	75	26	40	55	23	37	46	—	—	—
8		Tandem – Open Crossover	19	28	62	49	40	122	15	40	63	42	30	138	39	50	80
9		Open Center Partial – All Ports	18	34	46	31	34	75	17	32	50	23	40	70	510	250	400
33		Closed Center – Bleed A & B	30	28	55	38	45	83	30	40	55	38	37	76	—	—	—

## Pressure Drop at Rated GPM

DG5S4-06 @ 45

DG5S4-H06 @ 80

DG5S4-10 @ 125



Total pressure drop is determined from the pressure drop induced by check valve and other sources. (See graph, pilot pressure and integral check valve notes.) Total must be greater than minimum psi for good machine reliability.

1. Figures in pressure drop chart give approximate pressure drops ( $\Delta P$ ) when passing rated flow (Q) of 100 SUS fluid(s) having .865 specific gravity.

2. For any other flow rate (Q<sub>1</sub>), the pressure drop ( $\Delta P_1$ ) will be approximately:  $\Delta P_1 = P(Q_1/Q)^2$

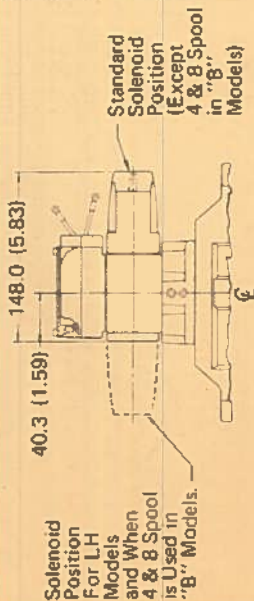
3. For any other viscosity(s), the pressure drop ( $\Delta P$ ) will change as follows:

Other Viscosity(s)	75	150	200	250	300	350	400
% Of $\Delta P$ (Approx.)	93	111	119	126	132	137	141

4. For any other specific gravity (G<sub>1</sub>), the pressure drop ( $\Delta P_1$ ) will be approximately:  $\Delta P_1 = \Delta P(G_1/G)$



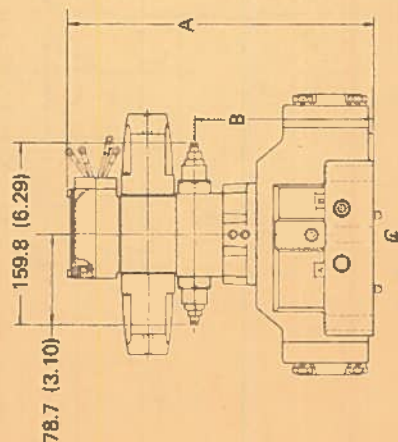
# SINGLE SOLENOID -- SPRING CENTERED "B" AND SPRING OFFSET "A" MODELS



Spring Offset Model -- When solenoid is de-energized, the spool is returned to the offset position by pilot pressure. There is no spring in the main valve section.

Model Series	Weight (Approx.) Kg	Weight (Approx.) Lbs.
DG5S4-06	14.5	32
DG5S4-H06	24	53
DG5S4-10	41.7	92

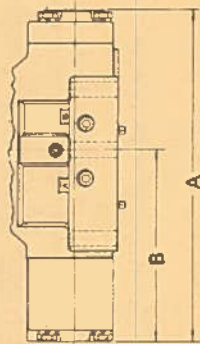
## MODELS WITH PILOT CHOKE ADJUSTMENTS



Pilot Choke adjusted by backing off locknuts and turning adjusting screws clockwise to slow down rate of spool travel and counterclockwise to increase this rate. Pilot oil for models with this feature should be taken from a source having constant pressure.

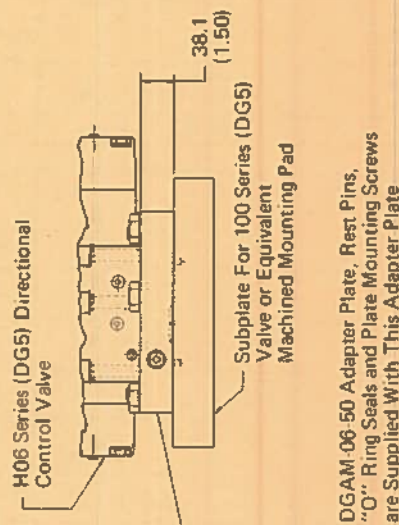
Model Series	A	B	Weight (Approx.) Kg	Weight (Approx.) Lbs.
DG5S4-06	265.0 (10.43)	154.4 (6.06)	16.8	37
DG5S4-H06	299.3 (11.78)	188.7 (7.43)	26.3	58
DG5S4-10	327.7 (12.90)	217.1 (8.56)	44.0	97

# PRESSURE CENTERED MODELS



Model Series	A	B	Weight (Approx.) Kg	Weight (Approx.) Lbs.
DG5S4-06	111.62 (4.39)	6.81 (0.27)	16.8	37
DG5S4-H06	116.38 (4.58)	9.32 (0.33)	29.5	65
DG5S4-10	117.56 (4.63)	10.12 (0.36)	44.9	99

## MOUNTING ADAPTER PLATE



The adapter plate and the H60 series (DG5) directional valves can be used in place of the 100 series (DG5) directional valves, in the application shown. The valve and adapter plate are mounted on the 100 series valve subplate or customers mounting pad. Adapter plate DGAM-06-50 has no "W" drain connection.

# MODELS WITH STROKE ADJUSTMENTS



Stroke adjustments limit movement of main stage spool. (Backing off jam nut and turning adjusting screw in shortens spool stroke.)

Model Series	A	B	Weight (Approx.) Kg	Weight (Approx.) Lbs.
DG5S4-06	172.2 (6.78)	38.9 (1.53)	19.5	43
DG5S4-H06	Not Available	Not Available	Not Available	Not Available
DG5S4-10	256.7 (10.50)	63.5 (2.50)	46.7	103

## STANDARD GRAPHICAL SYMBOLS FOR FLUID POWER DIAGRAMS

### SPRING OFFSET SINGLE SOLENOID "A"



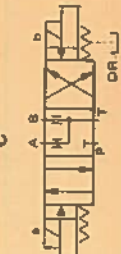
0, 2, 6, 9, 33 SPOOLS

### SPRING CENTERED SINGLE SOLENOID "B"



ALL SPOOLS

### SPRING CENTERED "C"



PRESSURE CENTERED "D"



ALL SPOOLS

### NO-SPRING DETENTED "N"

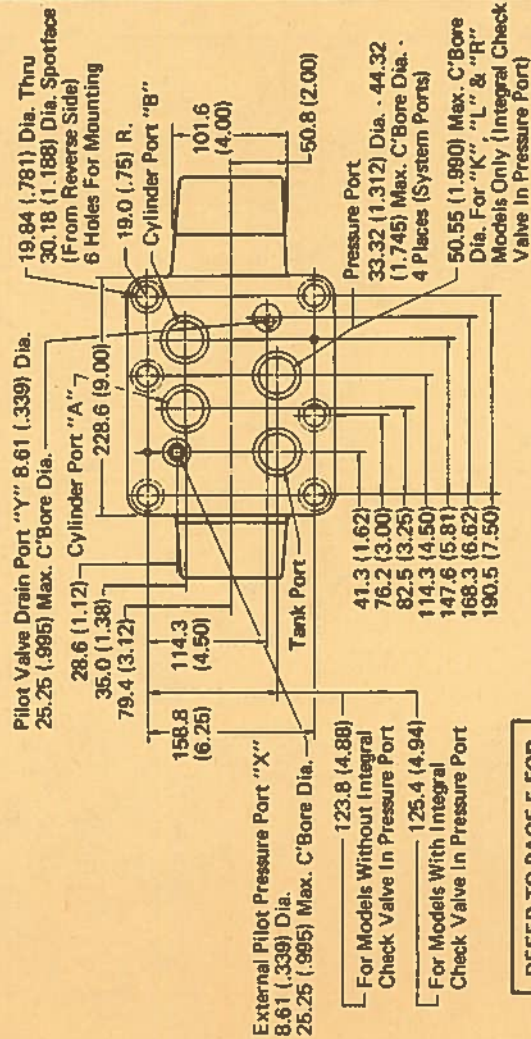
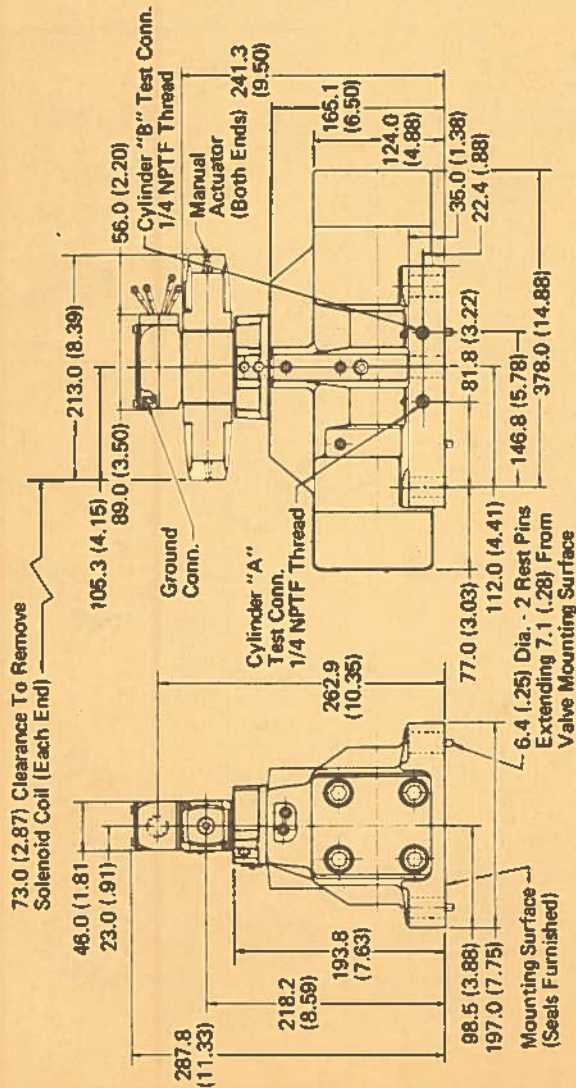


0, 2, 6, 9 & 33 SPOOLS

Note: When solenoid "a" is energized, flow is always P → A. When solenoid "b" is energized, flow is always P → B. Spring offset valves as shown (not LH) port P → A in the offset position. "B" models (not LH) port P → B when the remaining solenoid is energized. Solenoids "a" and "b" are identified on the diagram plate on the side of the pilot valve.

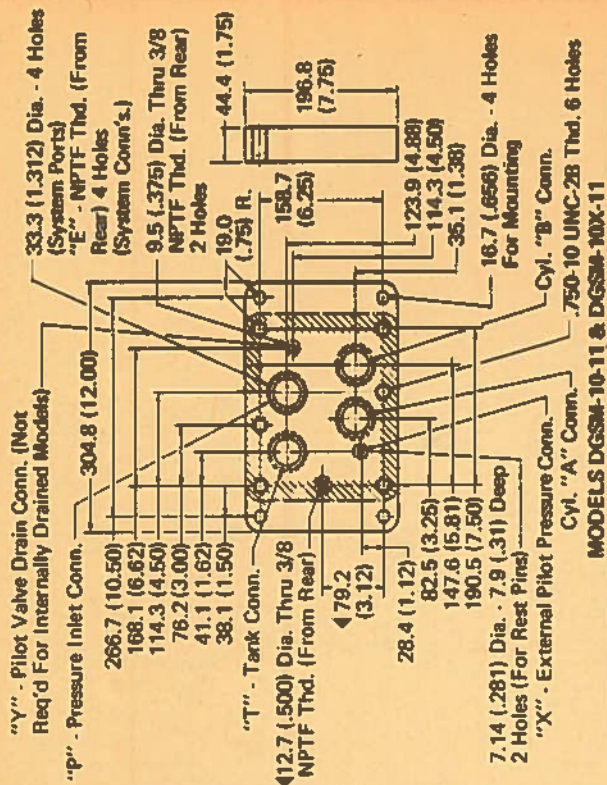


# MODEL SERIES DGSS4-10\*\*M-W\*-5\* DOUBLE SOLENOID NO-SPRING DETENTED AND SPRING CENTERED MODELS WEIGHT (APPROX.) 42.2 Kg (93 Lbs.)



REFER TO PAGE 5 FOR FLOW RATING CHART.

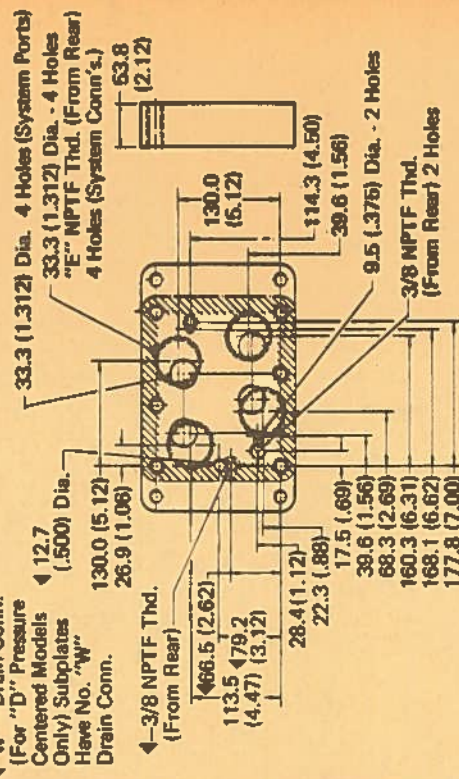
## MOUNTING SUBPLATES



## MODELS DGSM-10-11 & DGSM-10X-11

Subplate Model No.	"E" NPTF Thd.	Weight (Approx.)
DGSM-10-11	1-1/4	38 Lbs.
DGSM-10X-11	1-1/2	46 Lbs.

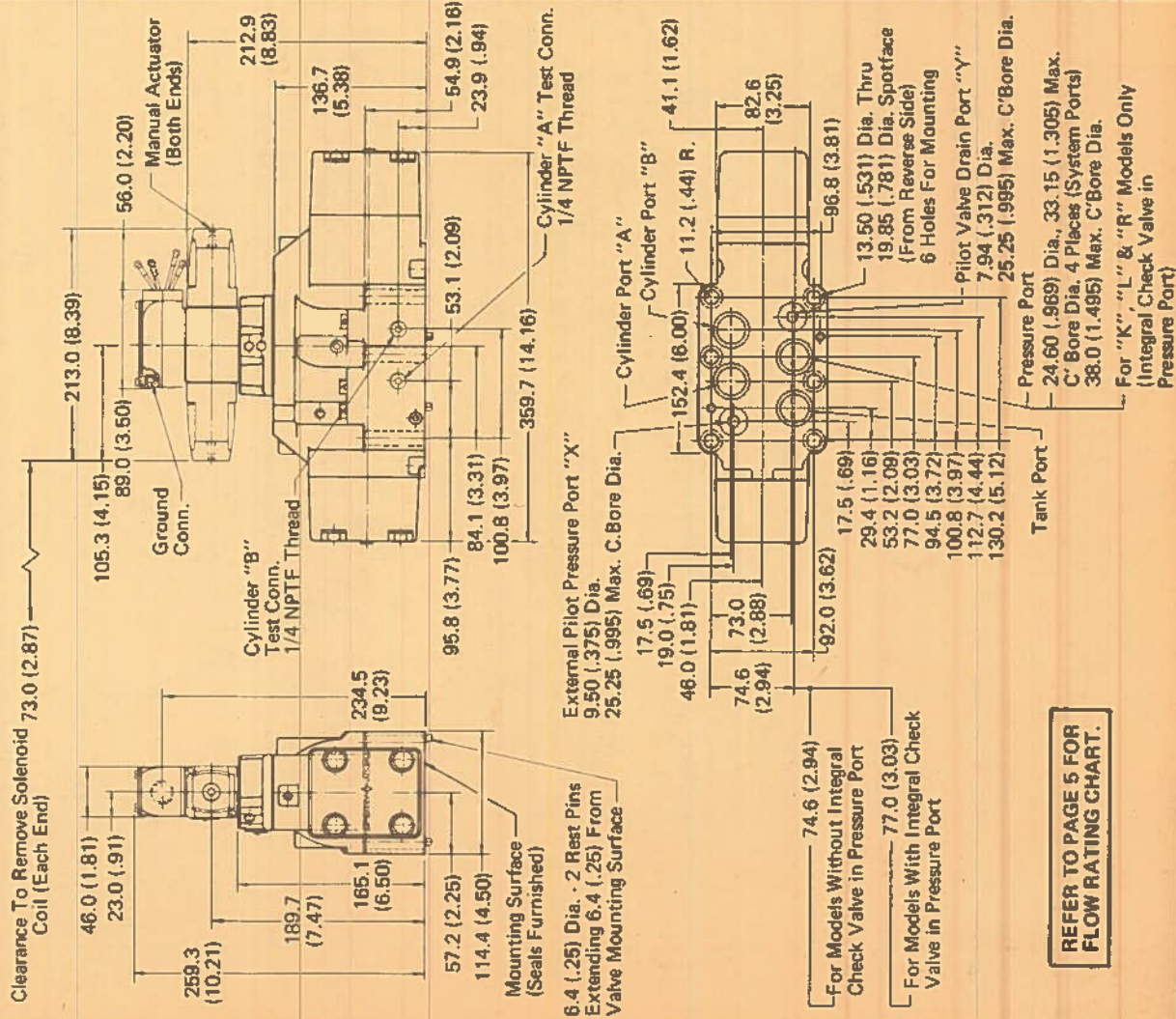
## "W" - Drain Conn.



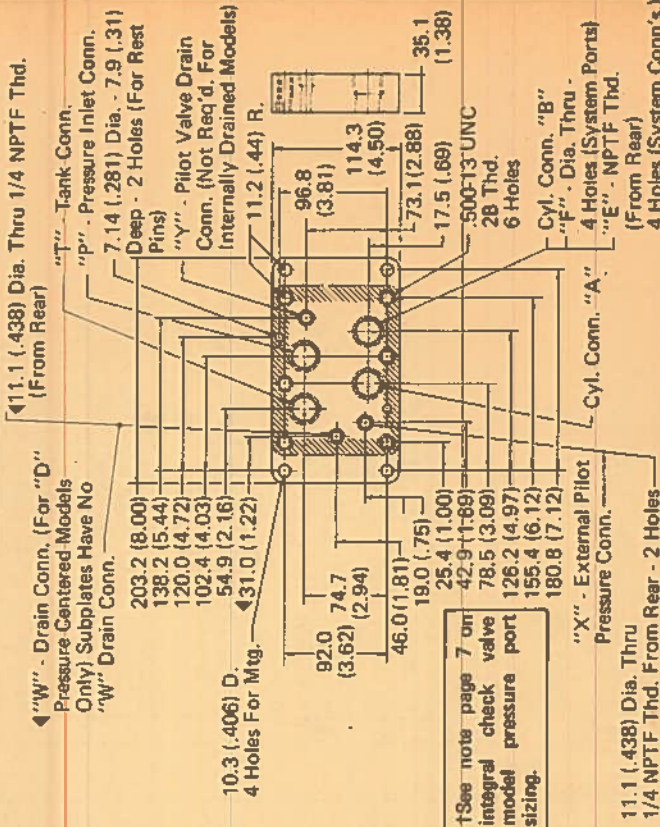
## MODEL DGSM-10Y-11



**MODEL SERIES DG5S4-H06\*\*M-W-5\***  
**DOUBLE SOLENOID NO-SPRING DETENTED AND SPRING CENTERED MODELS**  
**WEIGHT (APPROX.) 24.5 Kg (54 Lbs.)**

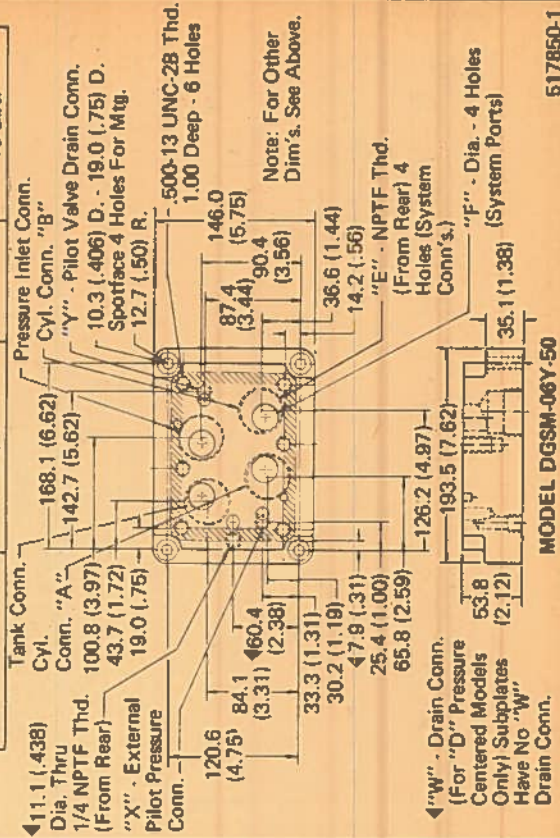


**MOUNTING SUBPLATES**



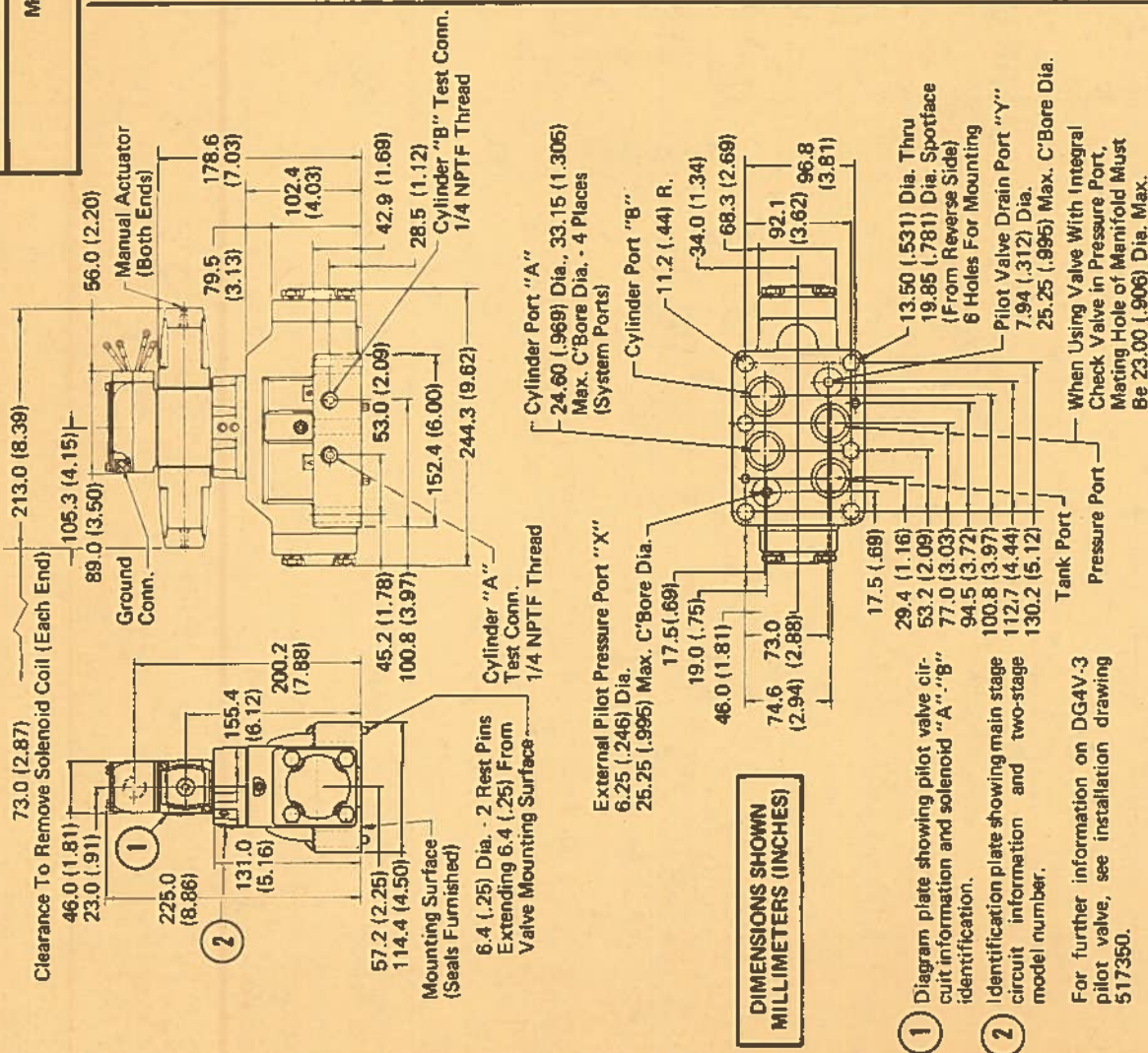
**MODELS DGSM-06-50 & DGSM-06X-50**

Model Number	"E" NPTF Thread	"F" Dia.	Weight (Approx.)
DGSM-06-50	3/4"	.906	11 Lbs.
DGSM-06X-50	1"	.969	16 Lbs.
DGSM-06Y-50	1-1/4"		





MODEL SERIES DG5S4-06\*\* M.W.\*.5\*  
DOUBLE SOLENOID NO-SPRING DETENTED AND SPRING CENTERED MODELS  
WEIGHT (APPROX.) 15 Kg (33 Lbs.)



- 1 Diagram plate showing pilot valve circuit information and solenoid "A", "g" identification.
- 2 Identification plate showing main stage circuit information and two-stage model number.

For further information on DG4V-3 pilot valve, see installation drawing 517350.

Subplates DGSM-06-50 and DGSM-06X-50 are used with both the DG54-06 and the DG54-H06. Please turn to the following page for pertinent information and dimensions regarding these subplates.

REVISÉ 4-3-78

**SOLENOID CONTROLLED  
PILOT OPERATED FOUR-WAY  
DIRECTIONAL VALVES**



**MODEL SERIES DG5S4-06, DG5S4-H06 AND DG5S4 10-M-W-5\***  
**MANIFOLD OR SUBPLATE MOUNTING**

## General Data

**This drawing includes data for the above three models as follows:**

Front: DGS54-06 Graphics & Basic Specifications, Page 1: DGS54-H06 Graphics, "06" & "H06" Subplates; Page 2: DGS54-100 Graphics, "100" Graphics, "06" & "H06" Subplates; Page 3: Basic Options and Graphical Symbols and Weights; Page 4: Pressure Drop Data; Page 5: H06 & 100 Series Basic Specifications, and Beginning of General Notes; Pages 6 & 7: General Notes, Specifications, Accessory Options and Model Code.

These are two-stage directional valves having a DG4V-3 (wet armature) pilot design. The mounting face is the same as the -5\* design. They are generally used to control the direction of flow in a hydraulic circuit. This in turn, would control the direction of movement of a work cylinder, or the rotation of a fluid motor.

**Specifications All Valves (See General Notes pages 5, 6 & 7)**

Maximum operating and pilot pressure (see flow ratings)..... 3000 psi  
Maximum tank line pressure: (see notes)

External drain models.....	3000 psi
Internal drain models (see drain notes).....	1500 psi

■ **Note:** For internally drained models, the tank return must be designed so that pilot valve transient tank line pressure peaks do not exceed 2500 psi (see pilot valve drain note).

## DG5S4-06 BASIC SPECIFICATIONS

### Pilot Pressure

**PILOT PRESSURE**

Maximum pilot pressure..... 3000 psi

All spools at zero flow require 75 psi pilot pressure. For maximum flow rate, 150 psi pilot pressure is required for open center spools (Types 0, 1, 2, 3, 4, 8 & 9) and 75 psi is required for closed center spools (Types 2, 3, 6 & 33). See additional notes page 5.

**Caution:** Pressure centered models require a minimum of 150 psi pilot pressure.

Valve Type	Spool Type	Recommended Flow Capacity	Maximum Flow Without Malfunction
No-Spring Detented	0, 2, 6, 9 & 33 "●"	45 GPM	100 GPM @ 3000 psi
	0, 4 & 8	45 GPM	80 GPM @ 3000 psi
	2, 3, 6 & 33 "●"		100 GPM @ 3000 psi
Spring Centered	1	45 GPM	45 GPM @ 3000 psi
	9	35 GPM	80 GPM @ 2000 psi
Spring Offset	0, 2, 6, 9 & 33 "●"	45 GPM	35 GPM @ 3000 psi
Pressure Centered	0, 1, 2, 3, 4, 6, 8, 9 & 33 "●"	45 GPM	45 GPM @ 2000 psi
			100 GPM @ 3000 psi

“●” As system flow increases the minimum pilot pressure required increases. These spools will operate satisfactorily in excess of 100 GPM with higher pilot pressures.

517850



SOLENOIDS ARE IDENTIFIED BY A LETTER IN THE MODEL NUMBER.

EXAMPLE: DG5S4-04\*-B-4\*

SOLENOID VOLTAGE RATING	IDENTIFICATION LETTER	INRUSH amps R.M.S.	HOLDING amps	HOLDING WATTS
115/120 V ac 60 Hz	B	2.0	.4	26
110 V ac 50 Hz				
230 V ac 60 Hz	D	1.0	.2	26
220/230 V ac 50 Hz	F	—	4.5	27
6 V dc	G	—	2.2	26
12 V dc				
24 V dc	H	—	1.1	26

● MAXIMUM PEAK INRUSH amps APPROXIMATELY 1.4 X R.M.S. VALUE SHOWN.

SHIFTING ACTION: SPRING CENTERED AND SPRING OFFSET MODELS MUST BE ENERGIZED CONTINUOUSLY. NO-SPRING DETENTED MODELS MAY BE ENERGIZED MOMENTARILY, BUT CONTINUOUS ENERGIZATION IS RECOMMENDED TO PREVENT VALVE REVERSAL.

SPRING CENTERED MODELS RETURN VALVE SPOOL TO CENTER POSITION WHEN BOTH SOLENOIDS ARE DE-ENERGIZED. SPRING OFFSET MODELS RETURN THE SPOOL TO OFFSET POSITION BY PILOT PRESSURE WHEN SOLENOID IS DE-ENERGIZED. WHEN NO-SPRING DETENTED MODELS ARE DE-ENERGIZED, THE SPOOL REMAINS IN THE LAST POSITION ATTAINED, HOWEVER, SHOCK, VIBRATION, UNUSUAL PRESSURE TRANSIENTS AND THE SPOOL NOT BEING HORIZONTAL MAY CAUSE VALVE REVERSAL. IF PILOT PRESSURE FAILS OR FALLS BELOW THE MINIMUM, THE MAIN SPOOL WILL SPRING CENTER (AT SPRING CENTERED FLOW RATES) AND CANNOT DRIFT TO REVERSAL OF FLOW (PILOT STAGE REMAINS IN DETENTED POSITION). CAUTION: BECAUSE OF THIS, THE FLOW CONDITIONS OF THE SPRING CENTERED POSITION MUST BE SELECTED WITH CARE, BOTH FOR THE EFFECT ON THE DIRECTION OF THE FLOW, AND THE PILOT PRESSURE.

NOTE: ANY SLIDING SPOOL VALVE, IF HELD SHIFTED UNDER PRESSURE FOR LONG PERIODS OF TIME, MAY STICK AND NOT SPRING RETURN DUE TO FLUID RESIDUE FORMATION AND, THEREFORE, SHOULD BE CYCLED PERIODICALLY TO PREVENT THIS FROM HAPPENING.

NOTE: SURGES OF OIL IN A COMMON PILOT VALVE DRAIN LINE, SERVING THESE AND OTHER VALVES, CAN BE OF SUFFICIENT MAGNITUDE TO CAUSE INADVERTENT SHIFTING OF THESE VALVES. THIS IS PARTICULARLY CRITICAL IN THE NO-SPRING DETENTED TYPE VALVES. SEPARATE DRAIN LINES OR A VENTED DRAIN MANIFOLD WITH A CONTINUOUS DOWNWARD PATH TO TANK IS NECESSARY.

NOTE: WHEN USED OTHER THAN A NORMAL 4 WAY VALVE, CONSULT YOUR SPERRY VICKERS REPRESENTATIVE.

#### PILOT VALVE DRAIN:

INTERNAL PILOT PRESSURE OF INTERNALLY DRAINED VALVES MUST ALWAYS EXCEED TANK LINE BACK PRESSURE BY THE REQUIRED MINIMUM. INTERNALLY DRAINED VALVES MAY BE USED ONLY WHEN SURGES IN THE TANK LINE CANNOT POSSIBLY OVERCOME THIS DIFFERENTIAL. INTERNAL DRAIN MAY BE USED WITH ALL VALVES, HOWEVER, AN INTEGRAL PRESSURE PORT CHECK VALVE (SEE OPTIONAL CHECK VALVE NOTE) IS REQUIRED FOR VALVES USING AN INTERNAL PILOT SOURCE WITH AN OPEN CENTER SPOOL (0, 4 AND 8 TYPES) IN ORDER TO MAINTAIN PILOT PRESSURE. IF AN EXTERNAL PILOT SOURCE IS USED THEN THE INTEGRAL CHECK VALVE IS NOT REQUIRED. WHEN INTERNAL PILOT DRAIN IS REQUIRED, ORDER ACCORDING TO MODEL CODE.

EXTERNAL: EXTERNALLY DRAINED VALVES ARE RECOMMENDED WHEN THE POSSIBILITY OF PRESSURE SURGES EXIST IN THE TANK LINE. THE PILOT VALVE DRAIN PORT (EXTERNALLY DRAINED VALVES) MUST BE CONNECTED DIRECTLY TO THE RESERVOIR THROUGH A SURGE FREE LINE IN SUCH A MANNER THAT NO BACK PRESSURE EXISTS AT THIS DRAIN PORT.

FILTRATION (REQUIRED): ..... (10 MICRON NOMINAL) 35 MICRON ABSOLUTE

#### MOUNTING POSITION

NO-SPRING DETENTED TYPE VALVES MUST BE INSTALLED WITH THE LONGITUDINAL AXIS HORIZONTAL FOR GOOD MACHINE RELIABILITY. MOUNTING POSITION OF SPRING CENTERED AND SPRING OFFSET VALVES IS UNRESTRICTED PROVIDED THAT

THE PILOT PRESSURE IS MAINTAINED AS REQUIRED. (SPRING OFFSET VALVES DO NOT HAVE A SPRING IN THE MAIN SPOOL SECTION.)

INTEGRAL CHECK VALVE (IN PRESSURE PORT) FOR OPEN CENTER SPOOLS. WHEN USING INTERNAL PILOT PRESSURE & INTERNAL PILOT DRAIN SELECT APPROPRIATE CHECK SPRING MODEL (K, L, R OR S) FROM "CHECK VALVE PRESSURE DROP VS FLOW" CURVE SHOWN ELSEWHERE. TOTAL PRESSURE DROP REQUIRED IS 75 PSI. (SEE PILOT PRESSURE RATINGS & NOTE) THEREFORE, DETERMINE VALVE AP (P TO T) AT THE ACTUAL APPLICATION FLOW RATE. SUBTRACT THIS VALUE FROM 75 PSI & CALL ITS VALUE "C". REFER TO THE CHECK VALVE PRESSURE DROP CURVE AT THE APPLICATION FLOW RATE & SELECT THE SPRING MODEL LETTER WHOSE CURVE IS ABOVE THE PSI VALUE "C".

#### COIL INDICATOR LIGHTS

LIGHTS ARE "ON" WHEN THERE IS CURRENT AT THE COILS. LIGHTS ARE AVAILABLE FOR 115 OR 230 VOLTS NOMINAL.

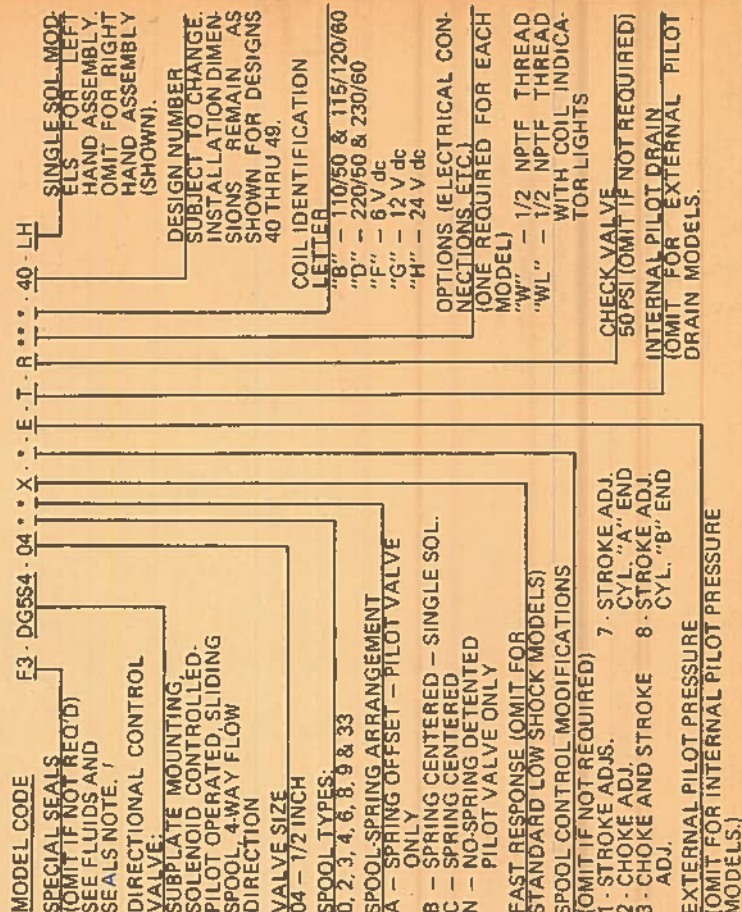
THE ELECTRICAL CONNECTIONS TO THE VALVE ARE MADE IN THE ELECTRICAL WIRING HOUSING. A GROUND TERMINAL IS PROVIDED AS SHOWN.

QUICK DISCONNECTS CAN BE READILY ADAPTED. OBTAIN FROM SUPPLIERS SUCH AS AMPHENOL, BRAD HARRISON, CAMLOCK, JOY, ETC.

FLUIDS AND SEALS: THE USE OF SYNTHETIC, FIRE-RESISTANT FLUIDS REQUIRES A VALVE WITH SPECIAL SEALS. ADD PREFIX "F3" TO MODEL NUMBER WHEN PHOSPHATE ESTERS OR ITS BLENDS ARE TO BE USED. WATER GLYCOL, WATER-IN-OIL EMULSIONS AND PETROLEUM OIL FLUIDS MAY BE USED WITH STANDARD SEALS. REFER TO DATA SHEET 1-286-S FOR FLUID AND TEMPERATURE RECOMMENDATIONS.

FAST RESPONSE: USE OF THIS OPTION DECREASES THE SHIFT TIME APPROXIMATELY 60 PERCENT. HOWEVER, THE SYSTEM SHOCK GENERATION IS CORRESPONDINGLY INCREASED.

NOTE: THE FAST RESPONSE OPTION IS NOT RECOMMENDED FOR PILOT PRESSURES EXCEEDING 2000 PSI.





MODEL NUMBERS			DIRECTION OF OIL FLOW FOR VALVE SPOOL POSITIONS	
DOUBLE SOLENOID		SINGLE SOLENOID SPRING OFFSET	CENTER - APPLIES TO: 1. DE-ENERGIZED SPRING CENTERED MODELS 2. ALL OTHER MODELS AT CENTER CROSSOVER	SEE NOTE ▲ COIL "A" ENERGIZED OR WHEN SPRING OFFSET
NO-SPRING DETENTED	SPRING CENTERED			SEE NOTE ▲ COIL "B" ENERGIZED
DG5S4-040N-40	DG5S4-040C-40	DG5S4-040A-40	"0" OPEN CENTER ALL PORTS	PR., CYL. A & CYL. B → TANK
DG5S4-042N-40	DG5S4-042C-40	DG5S4-042A-40	"2" CLOSED CENTER ALL PORTS	PR., CYL. A & CYL. B BLOCKED
	DG5S4-043C-40		"3" CLOSED CENTER P & B	PR. & CYL. B BLOCKED CYL. A → TANK
	DG5S4-044C-40		"4" TANDEM-CLOSED CROSSOVER	PR. → TANK CYL. A & CYL. B BLOCKED
DG5S4-046N-40	DG5S4-046C-40	DG5S4-046A-40	"6" CLOSED CENTER P ONLY	PR. BLOCKED CYL. A & CYL. B → TANK
	DG5S4-048C-40		"8" TANDEM-OPEN CROSSOVER	PR. → TANK CYL. A & CYL. B BLOCKED
		DG5S4-049A-40	"9" OPEN CENTER PARTIAL - ALL PORTS	PR., CYL. A & CYL. B → TANK
		DG5S4-0433A-40	"33" CLOSED CENTER BLEED A & B	PR. BLOCKED CYL. A & CYL. B → TANK

#### RATINGS

VALVE TYPE	SPOOL TYPE	PRESSURE (PSI)	RECOMMENDED FLOW CAPACITY (GPM)	MAX. FLOW (GPM) WITHOUT MALFUNCTION
SPRING CENTERED	2, 3, 6, 33	3000	25	60★
	0	3000	25	30
	4, 8	3000	12	12
SPRING OFFSET	0, 2	1000	25	30
	6	3000	25	60★
	9	3000	25	60★
NO-SPRING	0, 2, 6	3000	25	60★

★ AS SYSTEM FLOW INCREASES, THE MINIMUM PILOT PRESSURE REQUIRED INCREASES. THESE SPOOLS WILL OPERATE SATISFACTORILY IN EXCESS OF 60 GPM.

PILOT PRESSURE  
MAXIMUM PILOT PRESSURE  
ALL SPOOLS AT ZERO FLOW REQUIRE 75 PSI.  
AT MAXIMUM FLOW WITHOUT MALFUNCTION 80 PSI IS REQUIRED FOR OPEN CENTER SPOOLS (TYPES 0, 4, 8 & 9) AND 125 PSI IS REQUIRED FOR CLOSED CENTER SPOOLS (TYPES 2, 3, 6 & 33).

NOTE: THE PILOT PRESSURE STATED IS BASED ON INTERNALLY PILOTED AND EXTERNALLY DRAINED MODELS IN WHICH THE PILOT PRESSURE IS EQUAL TO THE PRESSURE AT THE VALVE PRESSURE PORT. WITH MODELS HAVING PRESSURE OPEN OR PARTIALLY OPEN TO TANK AT CENTER POSITION, PILOT PRESSURE CAN BE ASSURED BY IMPOSING A BACK PRESSURE OF AT LEAST THE REQUIRED MINIMUM PILOT PRESSURE AT THE TANK OUTLET CONNECTION (THIS BACK PRESSURE WILL BE PRESENT AT CYLINDER PORTS IF SPOOL IS "0"). SEE INTEGRAL CHECK VALVE NOTE.

WHEN PILOT PRESSURE FROM SEPARATE SOURCE (EXTERNAL) IS REQUIRED, AN EXTERNAL CONNECTION CAN BE PROVIDED. ORDER ACCORDING TO MODEL CODE. TYPICAL SHIFT TIMES IN MILLISECONDS FOR SPRING CENTERED VALVES AT RATED FLOW AND PRESSURE. (SEE NOTE ON FAST RESPONSE OPTION.)

PORT CONDITION	P	A or B	A or B → P
PILOT PRESSURE	80	125	500
OPEN CENTER SPOOLS	180	130	65
CLOSED CENTER SPOOLS	N.A.	125	65

■ ■ ■ MINIMUM PILOT PRESSURE

#### PSI PRESSURE DROP CHART

FLOW PATH				
SPOOL TYPE	P TO A	B TO T	P TO B	A TO T
0	25	40	25	25
2	35	45	35	35
3	35	45	35	35
4	70	85	70	85
6	35	40	35	35
8	35	60	35	50
9	25	40	25	25
33	35	45	35	35

1. FIGURES IN THE PRESSURE DROP CHART GIVE APPROXIMATE PRESSURE DROPS (ΔP) WHEN PASSING 25 GPM FLOW (Q) OF 100 SUS FLUID(S) HAVING .865 SPECIFIC GRAVITY.

2. FOR ANY OTHER FLOW RATE (Q<sub>1</sub>), THE PRESSURE DROP (ΔP<sub>1</sub>) WILL BE APPROXIMATELY:

$$\Delta P_1 = \Delta P (Q_1/Q)^2$$

3. FOR ANY OTHER VISCOSITY(S), THE PRESSURE DROP (ΔP) WILL CHANGE AS FOLLOWS:

OTHER VISCOSITY(S)	75	150	200	250	300	350	400
% OF ΔP (APPROX.)	93	111	119	126	132	137	141

4. FOR ANY OTHER SPECIFIC GRAVITY (G<sub>1</sub>), THE PRESSURE DROP (ΔP<sub>1</sub>) WILL BE APPROXIMATELY:

$$\Delta P_1 = \Delta P (G_1/G)$$

● SPECIFIC GRAVITY OF FLUID MAY BE OBTAINED FROM ITS PRODUCER. THE VALUE IS HIGHER FOR FIRE-RESISTANT FLUIDS THAN FOR OIL.

SOLENOIDS  
ELECTRIC SERVICE: SOLENOIDS ON MODELS LISTED ARE FOR 110 V ac 50 Hz - 115/120 V ac 60 Hz SERVICE. SPECIFY IN MODEL NUMBER IF OTHER THAN THIS SERVICE IS DESIRED. SEE MODEL CODE.

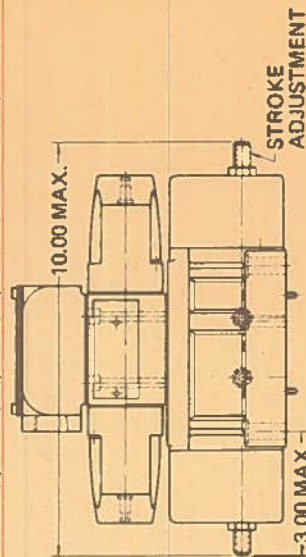
517810-2



**"Y" PILOT VALVE DRAIN GUNN. (NOT REQ'D FOR INTERNALLY DRAINED MODELS)**

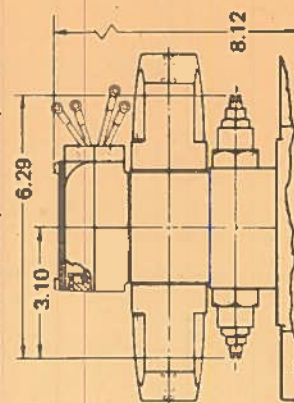
- .688 DIA.
- 1/2 NPTF THREAD (FROM REAR)
- 4 HOLES
- CYL. CONN. "A"
- PRESSURE INLET CONN.
- .375-16 UNC-2B THD.
- 4 HOLES FOR MOUNTING VALVE
- TANK CONNECTION
- .344 DIA. 4 HOLES FOR MOUNTING SUBPLATE
- 2.75
- 3.50
- 2.25
- .62
- 1.73
- .156 DIA. .31 DEEP
- 2 HOLES (FOR REST PINS)
- 2.19
- 2.81
- .56
- .38 R.
- 250-20 UNC-2B THREAD
- 2 HOLES FOR MOUNTING VALVE
- CYL. CONN. "B"
- 1.00
- .06
- 6.25
- 5.50
- 4.75
- 4.03
- 3.41
- 2.78
- 2.16
- 1.28
- .75
- 1/4 NPTF THREAD (FROM REAR)
- 2 HOLES
- 250 DIA.
- "X" EXT. PILOT PRESSURE CONN. NOT REQ'D FOR INTERNAL PILOT PRESSURE MODELS

DG5S4\*\*04\*\*\*.\*.\*.\*.\*-40  
WEIGHT LBS. (APPROX.). — 15.5 (SEE MODEL CODE.)



STROKE ADJUSTMENTS LIMIT MOVEMENT OF MAIN STAGES POOL.  
BACKING OFF JAM NUT AND TURNING ADJUSTING SCREW IN  
SHORTENS POOL STROKE.)

## WEIGHT LBS. (APPROX.) - 19



PILOT CHOKE ADJUSTED BY BACKING OFF LOCKNUTS AND TURNING ADJUSTING SCREWS COUNTERCLOCKWISE TO SLOW DOWN RATE OF SPOOL TRAVEL AND COUNTERCLOCKWISE TO INCREASE THIS RATE. PILOT OIL FOR MODELS WITH THIS FEATURE SHOULD BE TAKEN FROM A SOURCE HAVING CONSTANT PRESSURE.

**SUBPLATES AND BOLT KITS**  
**VALVES, SUBPLATES AND MOUNTING BOLTS MUST BE ORDERED SEPARATELY.**



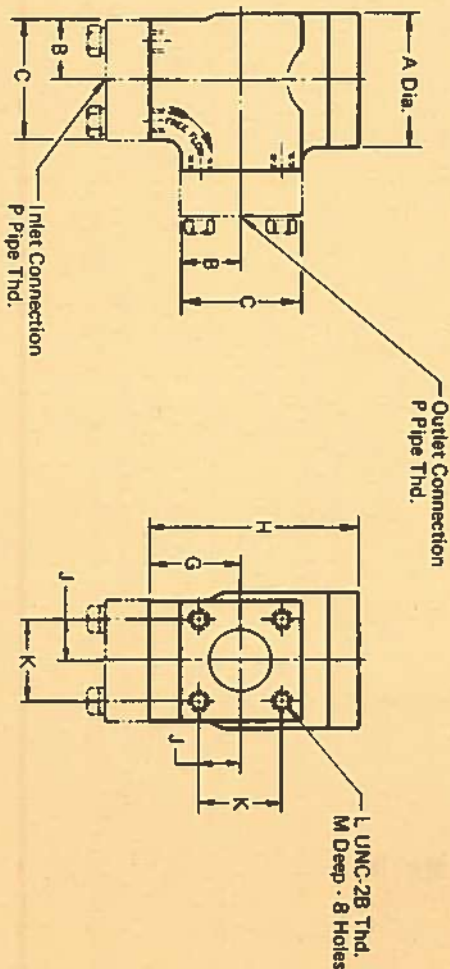
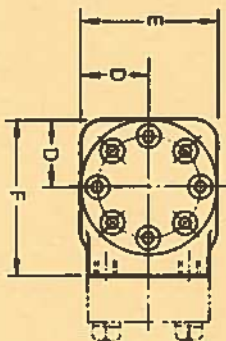
SPERRY VICKERS  
TROY, MICHIGAN 48064

**General Data**  
For use in oil hydraulic circuits where a spring closed check valve is required to allow flow in one direction (see arrow) and to prevent flow in opposite direction. Internal parts are of hardened and ground alloy steel as required for continuous high pressure hydraulic service.  
**Recommended** where a valve is required to check a high velocity reverse flow of fluid.  
**Maximum Operating Pressure**..... 3000 PSI  
**Nominal Flow Capacity**..... See Below

SPERRY VICKERS

CHECK VALVES

MODEL SERIES DF10P1-\*\*-\*-20  
RIGHT ANGLE - FLANGE CONNECTIONS



Model Number	Rated Capacity		Cracking Pressure Lb./Sq. In.	A	B	C	D	E	F	G	H	J	K	L	M	P	Weight Lbs. (Approx.)
	GPM	Lb./Sq. In.															
DF10P1-16-5-20	90 to 125	5	5	4.50	2.00	4.00	2.25	4.50	5.25	3.00	7.00	1.38	2.75	5/8-11	1.12	1-1/2 or 2"	29
DF10P1-16-65-20	5	65	5	8.25	2.75	5.50	4.12	8.25	8.50	3.88	11.00	1.88	3.75	7/8-9	1.44	2-1/2 or 3"	144
DF10P1-24-65-20	230 to 320	65	65														

RIGHT ANGLE  
TYPE

1-1/2 OR 2" &  
PIPE SIZES

FLANGE  
CONNECTIONS

DWG. NO.  
518800



Mounting position of valve is not limited because of spring closure construction.

Fluids and Seals

Refer to data sheet 1-286 S for hydraulic fluid and temperature recommendations. The use of synthetic, fire resistant fluids require a valve with special seals. Add prefix "F3" to model number when phosphate esters type fluids or blends are to be used. Water glycol, water-in-oil emulsions and petroleum oil fluids may be used with standard seals.

Filtration: ..... 35 Micron Absolute or Less

Connection Flanges

Connection flanges are available from Sperry Vickers and must be ordered separately:

Valves

Example: One (1) DF10P1-16-20

Flanges

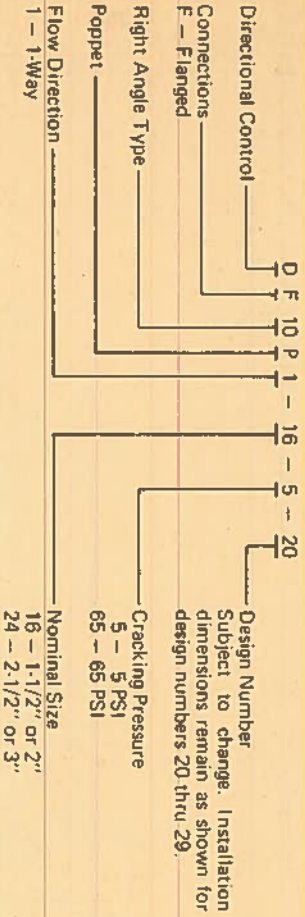
Two (2) FL12-PS-20 (1-1/2" NPTF)  
or Two (2) FL16-PS-20 (2" NPTF)

One (1) DF10P1-24-20  
Two (2) FL20-PS-20 (2-1/2" NPTF)  
or Two (2) FL24-PS-20 (3" NPTF)

Seals, screws and lockwasher for fastening flanges to valves are supplied with flanges.

Flanges for pipe weld or ell outlet are also available. Refer to drawing number 522900 for details.

Model Code



**STANDARD GRAPHICAL SYMBOL  
FOR FLUID POWER DIAGRAMS**



Pressure Drop

Pressure Drop PSI (Approx.)		
Model	GPM	PSI
DF10P1-16-5-20	45	9
	85	16
	125	29
DF10P1-24-5-20	100	7
	200	12
	320	19

1. The figures in the pressure drop chart give approximate pressure drops ( $\Delta P$ ) when passing flow of 100 SSU fluid(s), having .865 specific gravity.

2. For any other viscosity(s) the pressure drop ( $\Delta P_1$ ) will change as follows:

Other Viscosity(s)	75	150	200	250	300	350	400
% Of $\Delta P$ From Table (Approximate)	93	111	119	126	132	137	141

3. For any other specific gravity ( $G_1$ ) the pressure drops ( $\Delta P_1$ ) will be approximately:

$$\Delta P_1 = \Delta P (G_1 / G)$$

Specific gravity of fluid may be obtained from its producer. For fire resistant fluids, the value is higher than for oil.



**SPIERRE-VICKERS**

# HYDRAULIC PILOT OPERATED CHECK VALVES

SERIES 4CT...-20  
THREADED CONNECTIONS

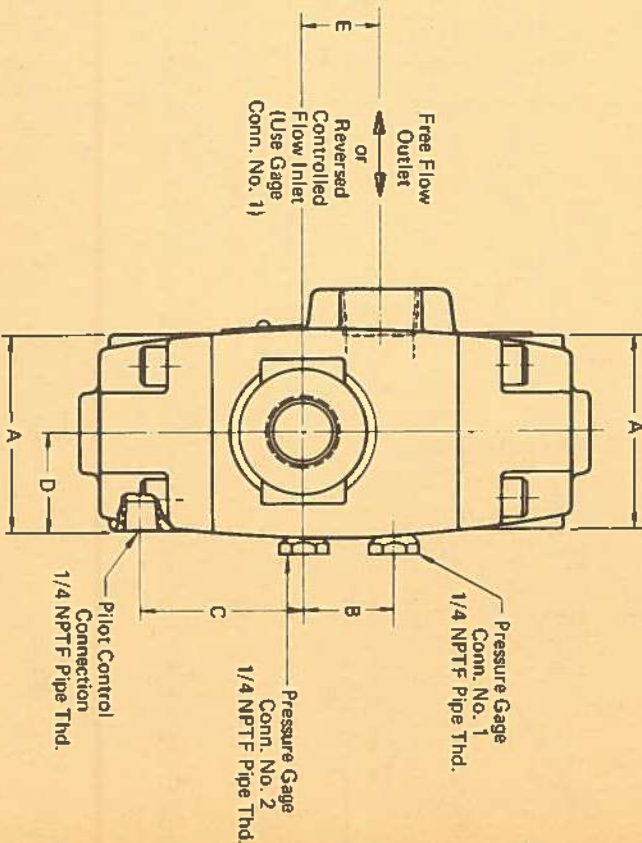
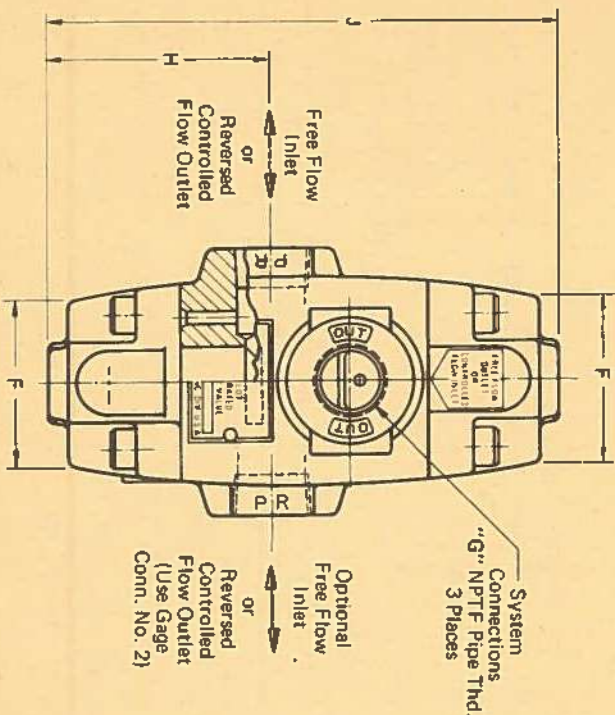
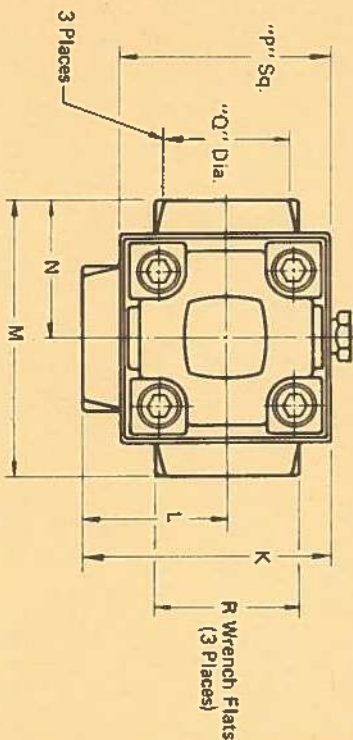
## General Data

These pilot operated check valves operate as a standard check valve and can be opened by remote pilot pressure on the control piston to permit reverse flow. The amount of pilot pressure required to open the check is stated as a ratio of the pressure above the check to the pilot pressure.

Valves with the decompression feature are designed to open a small poppet prior to opening the main check.

Maximum Operating Pressure (PSI)..... 3000

Flow Ratings (GPM)  
4CT-03..... 12  
4CT-06..... 30  
4CT-10..... 75



Model	Series	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	Wt. Lbs.
4CT-03...-20	30	2.25	.95	1.78	1.12	.91	2.00	3/8"	2.09	4.81	2.75	1.56	2.75	1.38	2.38	1.25	1.38	6.0
4CT-06...-20	60	2.76	1.25	2.25	1.38	1.06	2.31	3/4"	3.10	7.08	3.49	2.00	3.75	1.88	2.97	1.75	2.00	12.5
4CT-10...-20	100	3.75	1.15	3.10	1.88	1.14	3.60	1-1/4"	3.31	7.63	4.64	2.69	4.25	2.12	3.90	3.25	3.40	26.5



# Operating Information

Model Number	Flow Rating GPM (Nominal)	Area Ratio		Pressure Drop		"C" In Formula Below
		Pilot Piston Area To Decompression Poppet Area	Pilot Piston Area To Check Valve Area	•	••	
4CT-03-A	12	33.8:1	3.5:1	25	55	14
4CT-03-C					90	21
4CT-03-F					190	58
4CT-06-A	30	52.6:1	3.5:1	40	65	9
4CT-06-C					130	22
4CT-06-F					230	43
4CT-10-A	75	77.0:1	2.6:1	50	50	12
4CT-10-C					120	29
4CT-10-F					200	58

Approximate (PSI) pressure drop at rated flow:

- Valve held open by pilot pressure.
- Free flow across poppet.

## Formula

Pilot pressure to crack decompression poppet or check valve.

$$\text{Pilot Pressure (PSI)} = \frac{P_{\text{Out}} - P_{\text{In}}}{\text{Area Ratio}} + P_{\text{In}} + C$$

P<sub>In</sub> = Pressure (PSI) at free flow inlet  
P<sub>Out</sub> = Pressure (PSI)-at free flow outlet  
C = Taken from chart above

## Oil Viscosity Recommended

Oil viscosity ranging between 150 and 225 SSU at 100°F. is recommended. Refer to data sheet I-286-S for hydraulic fluid and temperature recommendations.

Filtration: ..... 25 Micron

## Fluids and Seals

The use of synthetic, fire resistant fluids require a valve with special seals. Add prefix "F3" to model number when phosphate esters or its blends are to be used. Water glycol, water-in-oil emulsions and petroleum oil fluids may be used with standard seals.

## Directional Valve

Directional valve types with cylinder ports open to tank in center position are recommended. (Spool types 0, 6, 9 and 33).

## Model Code

Special Seals  
See Fluids and Seals Note

Check Valve  
Pilot Operated

Piping Size  
03 - 3/8 in.  
06 - 3/4 in.  
10 - 1-1/4 in.

F3 - 4CT - 03 - • - 20

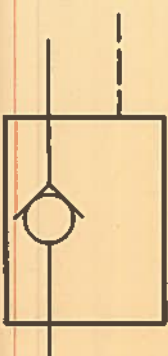
Design Number  
Subject to change. Installation dimensions remain as shown for designs 20 thru 29.

Cracking Pressure (PSI)

A - 30  
C - 75  
F - 150

D - With Decompression  
(Omit if not required)

STANDARD FLUID  
POWER SYMBOL





**SPEYRY VICKERS**  
TROY, MICHIGAN 48064

DIRECTIONAL  
CONTROLS

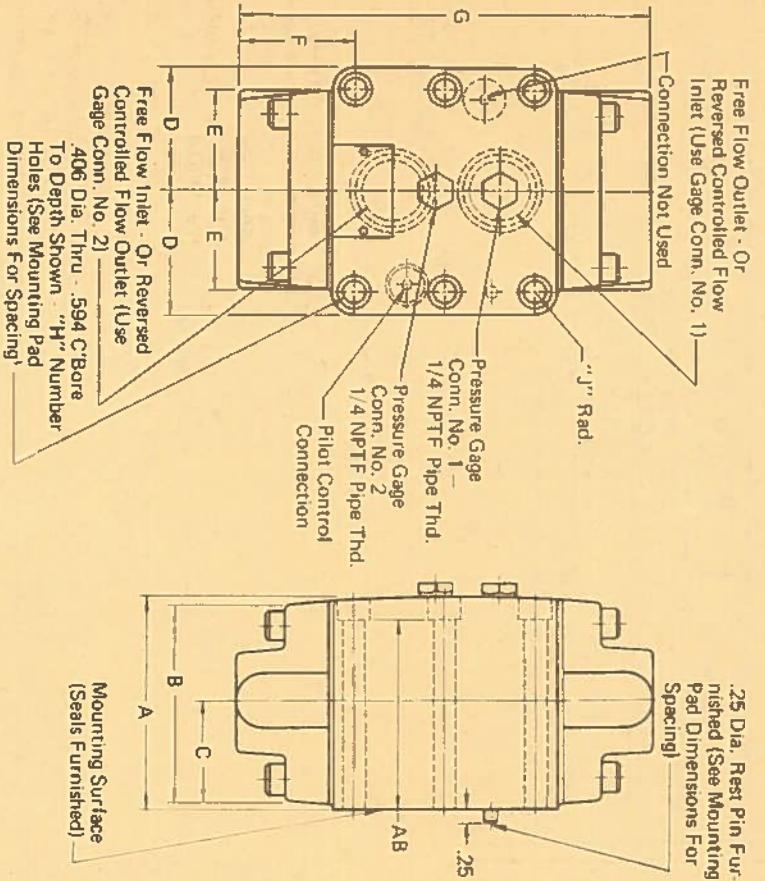
CHECK  
VALVES

PILOT  
OPERATED

FOR 3/8" TO  
1-1/2" PIPING

MANIFOLD OR  
SUBPLATE  
MOUNTING

DWG. NO.  
519010

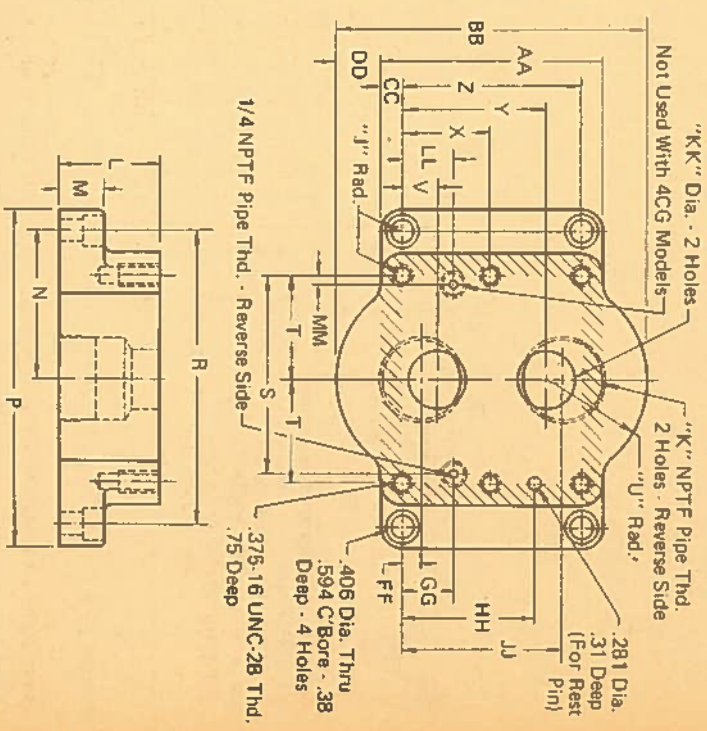


**SPEYRY VICKERS**

**HYDRAULIC PILOT OPERATED  
CHECK VALVES**

SERIES 4CG-\*\*-20  
MANIFOLD OR SUBPLATE MOUNTING

**MOUNTING SUBPLATES**



Valve Model Number	Dimensions											Wt. Lbs. (Approx.)
	A	B	C	D	E	F	G	H	J	AB	AB	
4CG-03-**-20	2.59	2.23	1.44	1.72	1.00	1.56	4.81	4	.41	2.20		8
4CG-06-**-20	3.12	2.64	1.63	2.00	1.38	2.36	7.08	4	.44	2.70		15
4CG-10-**-20	3.94	3.60	2.00	2.31	1.88	2.16	7.62	6	.41	3.55		26

Subplate Model Number	Dimensions																							Wt. Lbs. (approx.)	
	K	L	M	N	P	R	S	T	U	V	X	Y	Z	AA	BB	CC	DD	FF	GG	HH	JJ	KK	LL		MM
RXGM-03-20	3/8	1.00																							
RXGM-03X-20	1/2	1.25	.75	2.09	5.00	4.19	2.31	1.31	.94	.28	-	1.41	1.69	2.50	3.00	.41	.25	.19	.84	1.25	1.50	.56	.50	.31	3.0
RXGM-06-20	3/4	1.25																							
RXGM-06X-20	1	1.62	.75	2.44	5.75	4.88	2.88	1.56	1.56	.44	-	1.94	2.38	3.25	4.62	.44	.69	.25	.81	1.75	2.12	.91	.66	.25	6.0
RXGM-10-20	1-1/4	1.88																							
RXGM-10X-20	1-1/2	1.88	.88	2.72	6.25	5.44	3.66	1.91	1.88	.66	1.66	2.66	3.31	4.12	5.75	.41	.81	.31	.97	2.47	3.00	1.12	.97	.16	10.0



### General Data

These pilot operated check valves operate as a standard check valve and can be opened by remote pilot pressure on the control piston to permit reverse flow. The amount of pilot pressure required to open the check is stated as a ratio of the pressure above the check to the pilot pressure.

Valves with the decompression feature are designed to open a small poppet prior to opening the main check.

### Operating Information

Model Number	Flow Rating GPM (Nominal)	Area Ratio		Pressure Drop	"C" in Formula Below
		Pilot Piston Area To Decompression Poppet Area	Pilot Piston Area To Check Valve Area		
4CG-03-A	12	33.8:1	3.5:1	●	14
4CG-03-C				●●	21
4CG-03-F				●●●	58
4CG-06-A	30	52.6:1	3.5:1	●	9
4CG-06-C				●●	22
4CG-06-F				●●●	43
4CG-10-A	75	77.0:1	2.6:1	●	12
4CG-10-C				●●	29
4CG-10-F				●●●	58

Approximate (PSI) pressure drop at rated flow:

● Valve held open by pilot pressure.

●● Free Flow across poppet.

### Formula

Pilot pressure to crack decompression poppet or check valve.

$$\text{Pilot Pressure (PSI)} = \frac{P_{\text{Out}} - P_{\text{In}}}{\text{Area Ratio}} + P_{\text{In}} + C$$

$P_{\text{In}}$  = Pressure (PSI) at free-flow inlet

$P_{\text{Out}}$  = Pressure (PSI) at free-flow outlet

$C$  = Taken from chart above.

Maximum Operating Pressure (PSI): ..... 3000

### Mounting Subplates and Bolt Kits

Valves, subplates and mounting bolts must be ordered separately.

Example:

Valve	Subplate	Bolt Kit
One (1) 4CG-03 * 20	One (1) RXGM-03-20 or One (1) RXGM-03X-20	BKRX-03-660
One (1) 4CG-06 * 20	One (1) RXGM-06-20 or One (1) RXGM-06X-20	BKRX-06-661
One (1) 4CG-10 * 20	One (1) RXGM-10-20 or One (1) RXGM-10X-20	BKRX-10-662

### Installation Requirements

When subplate is not used, a machined pad (as indicated by subplate shaded area) must be provided for mounting. Pad must be flat within .0005 inch and smooth within 63 microninch. Mounting bolts when provided by customer, should be SAE grade 7, or better.

### Oil Viscosity Recommended

Oil viscosity ranging between 150 and 225 SSU at 100°F. is recommended. Refer to data sheet 1-286-S for hydraulic fluid and temperature recommendations.

Filtration: ..... 25 Micron

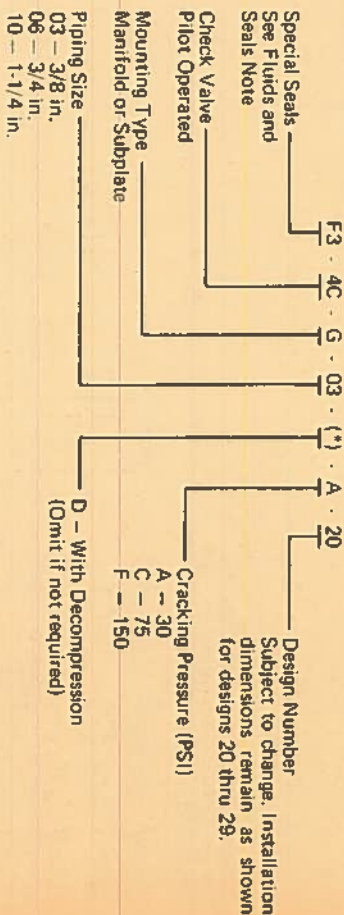
### Fluids and Seals

The use of synthetic, fire resistant fluids require a valve with special seals. Add prefix "F3" to model number when phosphate esters or its blends are to be used. Water glycol, water-in-oil emulsions and petroleum oil fluids may be used with standard seals.

### Directional Valve

Directional valve types with cylinder ports open to tank in center position are recommended. (Spool types 0, 6, 9 and 33).

### Model Code



STANDARD FLUID  
POWER SYMBOL



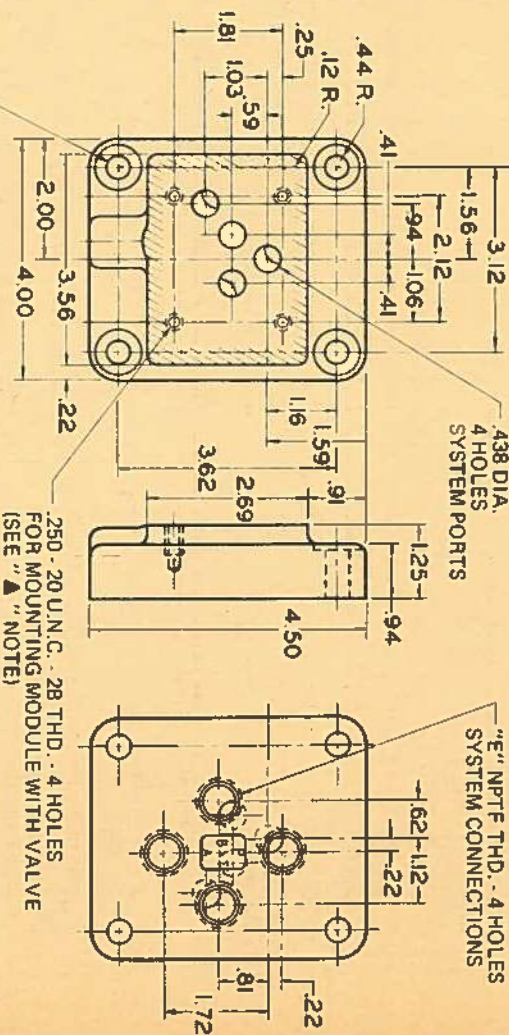


**SPERRY VICKERS**  
TM

# HYDRAULIC PRESSURE OPERATED CHECK MODULE

MODEL SERIES DGPC-01-A\*8\*50  
MANIFOLD OR SUBPLATE MOUNTING

## MOUNTING SUBPLATES



SPERRY VICKERS  
TROY, MICHIGAN 48084

PRESSURE OPERATED  
CHECK MODULE

3/8" & 1/2"  
PIPING

MANIFOLD OR  
SUBPLATE MOUNTING

DWG. NO.  
518890

REVISED 12-1-78

DG VALVE MOUNTING SURFACE

OPTIONAL TANK PORT OR DRAIN  
PORT FOR CONVENIENCE OF USERS  
IN APPLYING TO DRILLED PANELS

281 DIA. 4 HOLES  
FOR MOUNTING  
MODULE WITH VALVE  
(SEE "A" NOTE)

MOUNTING SURFACE  
(SEALS FURNISHED)

## MOUNTING SUBPLATES AND BOLT KITS

VALVES, MODULES, SUBPLATES AND MOUNTING BOLTS MUST BE ORDERED SEPARATELY.

EXAMPLE: ONE (1) DG4S4-012C-50 VALVE

ONE (1) DGPC-01-AB-50 MODULE

ONE (1) DGSM-01X-10 SUBPLATE

ONE (1) BKDGPC01-690 BOLT KIT

SIDE CONNECTION SUBPLATES ARE ALSO AVAILABLE WITH 3/4" & 1" PIPE THREADS. SEE DRAWING NO. 522800.

"A" NOTE:

MAXIMUM RECOMMENDED MOUNTING BOLT TORQUE FOR VALVE WITH MODULE.....

112 IN. LBS.

WHEN SUBPLATE IS NOT USED, A MACHINED PAD (AS INDICATED BY SUBPLATE SHADED AREA) MUST BE PROVIDED FOR MOUNTING; PAD MUST BE FLAT WITHIN .0005 INCH AND SMOOTH WITHIN 63 MICROINCH. MOUNTING BOLTS, WHEN PROVIDED BY CUSTOMER, SHOULD BE SAE GRADE 7, OR BETTER.

SUBPLATE MODEL NUMBERS	"E" NPTF THREAD	WEIGHT LBS. (APPROX.)
DGSM-01X-10	3/8	4 1/2
DGSM-01Y-10	1/2	



**GENERAL DATA**  
THESE MODULES CONTAIN A CHECK VALVE IN BOTH CYLINDER PORTS. THEY ARE ARRANGED FOR FREE FLOW OUT OF THE DG, DIRECTIONAL VALVE.

FOR RETURN FLOW, ONE CHECK CAN BE UNSEATED BY A COMMON STRIKER PISTON MOUNTED CO-AXIALLY BETWEEN THE TWO CHECKS. THIS HAPPENS WHEN INTERNAL PRESSURE ON ONE SIDE IS SUFFICIENT TO CAUSE THE STRIKER PISTON TO OPEN THE CHECK VALVE ON THE OPPOSITE SIDE. IN A NEUTRAL CONDITION (WITH CYLINDER PORTS OPEN TO TANK AT THE DIRECTIONAL VALVE) COMPRESSION SPRINGS WILL SEAT THE CHECKS AND THE MACHINE ACTUATOR WILL BE HELD STATIONARY.

WITHIN EACH POPPET PISTON IS A SMALL DECOMPRESSION POPPET WHICH OPENS BEFORE THE MAIN CHECK VALVE. (AVAILABLE WITHOUT DECOMPRESSION POPPET ON REQUEST.)

**OPENING RATIOS**  
DECOMPRESSION POPPET..... 19.2:1  
CHECK..... 2:1

**CRACKING PRESSURES**  
(EACH CHECK)..... 30 PSI  
(OTHER CRACKING PRESSURES AVAILABLE ON REQUEST)

**FLOW CAPACITY**  
RATED..... 10 GPM  
MAXIMUM (RECOMMENDED)..... 20 GPM

**PRESSURE**  
MAXIMUM INLET PRESSURE..... 3000 PSI

**DIRECTIONAL VALVE**  
DIRECTIONAL VALVE TYPES WITH CYLINDER PORTS OPEN TO TANK IN CENTER POSITION ARE RECOMMENDED. (SPOOL TYPES 0, 6, 9 AND 33). THE DGPC MODULE IS NOT USABLE WITH THE DG18 AIR OPERATED VALVES.

**PRESSURE DROP (APPROX.)**  
THROUGH THE MODULE AT 10 GPM AND 100 SSU IS 75 PSI. (TOTAL DROP P TO A PLUS B TO T).

**FLUIDS AND TEMPERATURES**  
AN OIL VISCOSITY RANGING BETWEEN 150 SSU (LIGHT) AND 225 SSU (MEDIUM) AT 100° F. FOR AMBIENT TEMPERATURES ABOVE 65° F. IS RECOMMENDED. REFER TO DATA SHEET I-2865 FOR HYDRAULIC FLUID AND TEMPERATURE RECOMMENDATIONS.

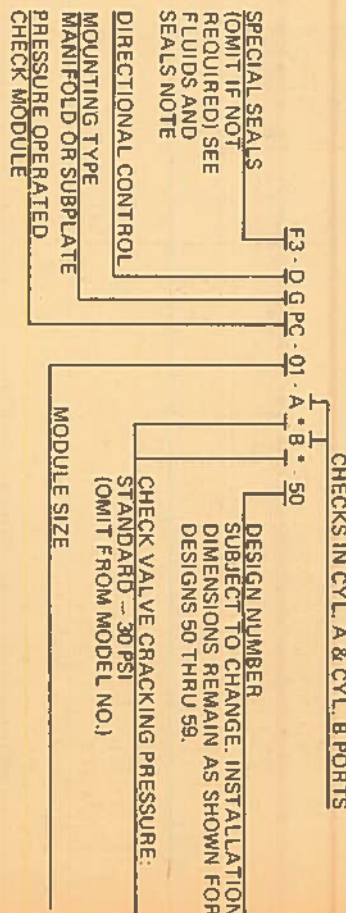
**FLUIDS AND SEALS**  
THE USE OF SYNTHETIC, FIRE RESISTANT FLUIDS REQUIRES THE USE OF SPECIAL SEALS (SEE MODEL CODE). WATER GLYCOL, WATER-IN-OIL EMULSIONS AND PETROLEUM OIL MAY BE USED WITH STANDARD SEALS.

**WEIGHT LBS. (APPROX.)**..... 11

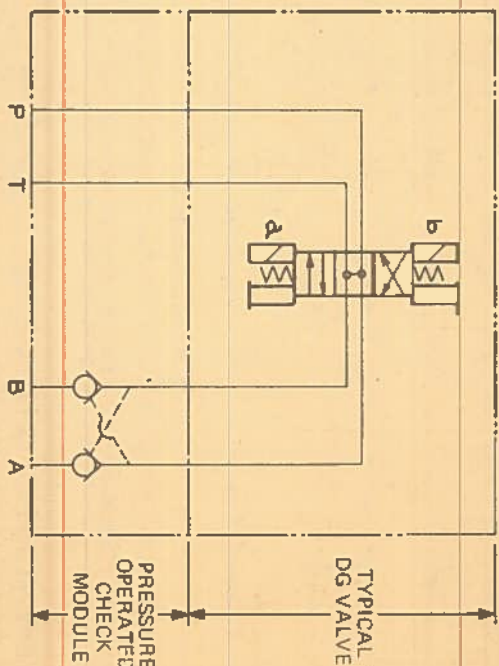
**NOTE**  
FOR FURTHER INFORMATION ON INSTALLATION, RATINGS, AND PERFORMANCE DATA, REFER TO DRAWING OF DIRECTIONAL VALVE USED WITH THIS MODULE.

MOUNTING BOLT KITS USED WITH DG VALVES AND TWO OR THREE MODULES ARE LOCATED IN THE ACCESSORY SECTION.

**MODEL CODE**



GRAPHICAL SYMBOL  
(DG VALVE WITH MODULE)

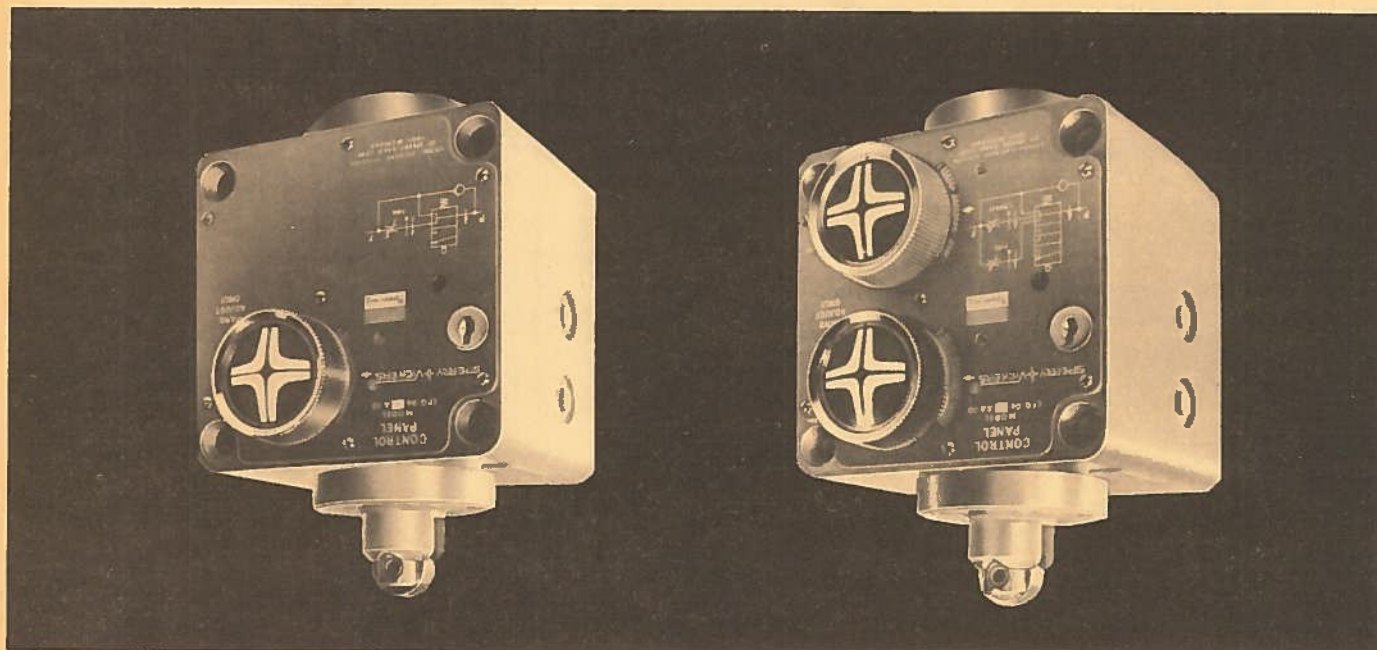




## tri-speed control panels deceleration, single and dual feed, or tri-speed

These flexible, low cost Sperry Vickers valve packages provide your machine tool feed operation with four functions - rapid traverse, deceleration, coarse and/or fine feed. Their versatility brings substantial savings in retooling costs. Available with one or two controls, the units can be quickly converted to either model with a field conversion kit.

They are the most precise flow regulators on the market today. The pressure and temperature compensated Tri-Speed Control Panels have a metering capacity to 16 gpm. With traverse capabilities to 30 gpm and 3000 psi, they provide an infinite number of feed rates. Installation is simplified with only two external connections. A tamper-proof locking device is standard equipment.





INDEX

SECTION G - CONTROL ASSEMBLIES

DESCRIPTION	DWG. NO.	PAGE NO.
CPG-06-***-11 Control Panels, Subplate Mounting	519410A	9 - 1
CPGD-06-***-11 Control Panels, Subplate Mounting	519420	9 - 4

MODEL CODES

Model codes in this catalog list many options. Some possible model combinations are not readily available. Please contact your Sperry Vickers representative to verify availability.



**SPIERDY VICKERS**  
TROY, MICHIGAN 48064

CONTROL PANELS

DUAL AND TRI-SPEED

TEMPERATURE COMPENSATED

3/4" & 1" PIPING

30 GPM FLOW CAPACITY

DWG. NO. 519410A

# CONVERSION KITS

TO CONVERT FROM A SINGLE FEED TO A DUAL FEED MODEL (WITH STD. LOCK) ORDER KIT NO. 942245.

TO CONVERT FROM A SINGLE FEED TO A DUAL FEED MODEL (WITH LOCK OPTION "L") ORDER PARTS FROM SERVICE DRAWING 1-3603S.

SPRING RETURNS VALVE SPOOL TO EXTENDED POSITION SHOWN (ROLLER CAN BE ROTATED 90°, TAP OUT ROLLER PIN UNTIL ROLLER CAN BE REMOVED, ROTATE PLUNGER 90°, REPLACE ROLLER AND PIN.)

TRIM ADJUSTMENT (CLOCKWISE ROTATION INCREASES FLOW, COUNTERCLOCKWISE ROTATION DECREASES FLOW)

.87 DIA. ROLLER

FULL OUT POSITION

.31 HEX. KEY

OUTLET PORT "F"

INLET PORT "P"

REST PIN

TWO KEYS FURNISHED

COARSE FEED CAM SET-UP .32 FINE FEED CAM SET-UP .46

NOMINAL RANGE

.25-DECELERATION

.14-COARSE FEED

.11-FINE FEED

.50-TOTAL STROKE

NOMINAL RANGE

.25-DECELERATION

.25-FINE FEED RANGE

.50-TOTAL STROKE

REVOLUTION INDICATOR

REVOLUTION INDICATORS (LETTERS "A" THRU "E" INDICATE NUMBER OF COMPLETE REVOLUTIONS)

.406 DIA. THRU .594 C/BORE .38 DEEP 4 HOLES FOR MOUNTING

COARSE FEED ADJUSTMENT (FOR DUAL FEED CONTROL PANEL ONLY)

CLEARANCE REQUIRED TO REMOVE KEY

ACCESS HOLE COVERED WHEN UNIT IS LOCKED. UPON TURNING KEY OR LOCK OPTION LOCK SCREW IS ACCESSIBLE. LOOSEN TO CHANGE DIAL SETTING.

WINDOW OPEN - TURN CW WINDOW CLOSED - TURN CCW

TRIM ADJUSTMENT OPTION FOR MODEL CPG-06 \*A\* \*L\* \*11

DUAL FEED MODEL CPG-06 \*AA\* \*11

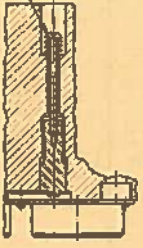
SINGLE FEED MODEL CPG-06 \*A\* \*11

**SPIERDY VICKERS**

# CONTROL PANELS

DECELERATION, SINGLE AND DUAL FEED OR TRI-SPEED  
MODEL SERIES CPG-06 \*\*\*11  
MANIFOLD MOUNTING

TO UNCOVER ACCESS HOLE COMPRESS SPRING AND TURN COUNTERCLOCKWISE

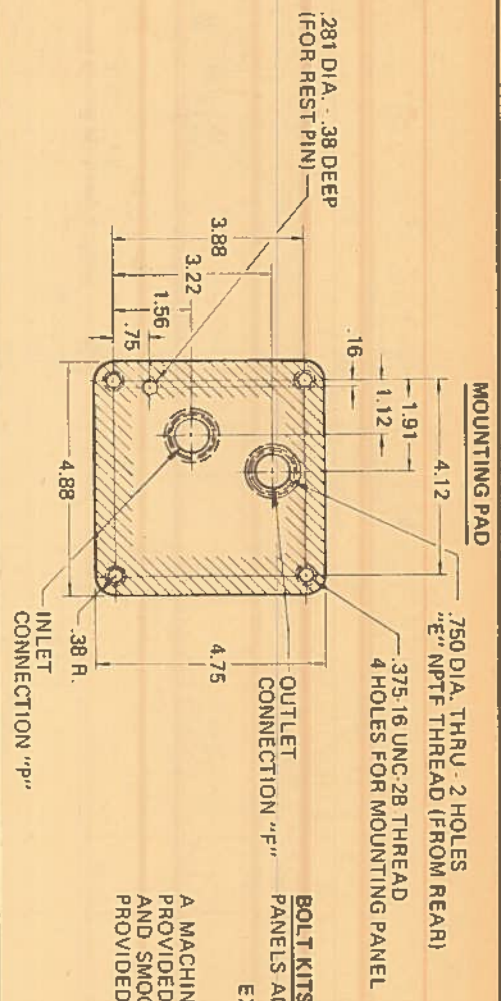


LOCK OPTION MODEL CPG-06 \*A\* \*L\* \*11

TO COVER ACCESS HOLE TURN COUNTERCLOCKWISE WITH SCREW DRIVER







**BOLT KITS**

PANELS AND MOUNTING BOLTS MUST BE ORDERED SEPARATELY.  
 EXAMPLE: ONE (1) BKC-PG-06-AA-11 PANEL  
 ONE (1) BKC-PG-06-607 BOLT KIT  
 A MACHINED PAD (AS INDICATED BY SHADED AREA) MUST BE PROVIDED FOR MOUNTING: PAD MUST BE FLAT WITHIN .0005 INCH AND SMOOTH WITHIN 63 MICRORINCH. MOUNTING BOLTS, WHEN PROVIDED BY CUSTOMER, SHOULD BE SAE GRADE 7, OR BETTER.

**GENERAL DATA**

GENERAL USAGE IN OIL HYDRAULIC CIRCUITS FOR CONTROLLING RAPID TRAVERSE AND FEED CYCLES. THIS PANEL IS USUALLY INSTALLED IN METER-OUT CIRCUITS AND IS ACTUATED BY A CAM. IN ADDITION TO BEING PRESSURE AND TEMPERATURE COMPENSATED DURING THE FEED PHASES OF THE CYCLE, THE UNIT IS PRESSURE COMPENSATED DURING DECELERATION WHICH OCCURS DURING THE INITIAL 1/4" OF SPOOL MOVEMENT. THE DECELERATION SPOOL MAY BE POSITIONED WITHIN THIS 1/4" BY A CAM TO PROVIDE AN ADDITIONAL FEED OR SPEED RATE. THE NORMAL FEED RATES OCCUR WHEN THE SPOOL IS DEPRESSED THE REMAINING 1/4" OF THE TOTAL 1/2" TRAVEL. THE MAXIMUM RECOMMENDED CAM DEPRESSING ANGLE IS 30°. THE VALVE PLUNGER IS DEPRESSED AGAINST A MAXIMUM SPRING LOAD OF APPROXIMATELY 80 LBS.

**SPECIFICATIONS**

FLOW CONTROL ADJUSTMENTS ARE ACCOMPLISHED BY ROTATION OF SELECTOR DIALS. REVOLUTION INDICATORS, LETTERED "A" THRU "E" REGISTER APPROXIMATELY FOUR (4) REVOLUTIONS FROM FULLY CLOSED TO FULLY OPEN CONDITION (5 CU. IN./MIN. TO 6.50 GPM, COARSE OR FINE FEED DIAL).

MAXIMUM THROTTLE OPENINGS MAY BE LIMITED BY ADDITION OF SPACERS TO THE THROTTLE SHAFT UNDER THE SELECTOR DIALS. SPACERS ARE AVAILABLE FROM SPERRY VICKERS FOR INSTALLATION BY USER.

NUMBER OF SPACERS	APPROXIMATE MAXIMUM CONTROLLED FLOW (CU. IN./MIN.) USING SPACER PART NO. 211026	FINE FEED DIAL	COARSE FEED DIAL
4	100	400	800
3	300	800	1200
2	700	1200	1400
1	1100	1400	

**MAXIMUM FLOW CAPACITY**

10, 15, 20 & 30 GPM RAPID TRAVERSE: 13 GPM  
 COARSE FEED METERED: 6.5 GPM FINE FEED METERED: 30 GPM REVERSE FREE FLOW.

MINIMUM METERED FLOWS	APPROX. MIN. FLOW (IN. 3/MIN.)
OPERATING PRESSURE	
250 PSI	5
500	6
1000	9
1500	12
2000	15
2500	18
3000	20

**MAXIMUM OPERATING PRESSURE**

TO ENSURE PRESSURE COMPENSATION DURING DECELERATION AND FEED, THE PRESSURE DIFFERENCE BETWEEN INLET AND OUTLET PORTS SHOULD BE 250 PSI. PRESSURE DROP CURVES FOR RAPID ADVANCE ARE SHOWN ON PAGE 519410A-2.

**FLUIDS AND SEALS**

ALL PANELS HAVE VITON SEALS (STD.) FOR USE WITH PETROLEUM OIL, PHOSPHATE ESTERS AND ITS BLENDS, WATER-IN-OIL EMULSIONS AND WATER GLYCOL FLUIDS. REFER TO DATA SHEET 1-286-S FOR HYDRAULIC FLUID AND TEMPERATURE RECOMMENDATIONS.

**TRIM ADJUSTMENT (OPTIONAL)**

PERMITS AN ADJUSTMENT OF APPROXIMATELY 14% OF THE FLOW SETTING WHEN VALVE LOCKING DEVICE IS IN A LOCKED POSITION. (CLOCKWISE ROTATION INCREASES FLOW, COUNTERCLOCKWISE-ROTATION DECREASES FLOW).

**VALVE LOCKING**

A KEY LOCKING DEVICE IS SUPPLIED WITH THESE VALVES. AN OPTIONAL DEVICE IS ALSO AVAILABLE. INSTEAD OF USING A KEY, THE VALVE IS REMOVED FROM ITS MOUNTING TO OPEN THE ACCESS HOLE, WHICH IS ON THE FRONT OF THE VALVE. THE VALVE IS THEN RETURNED TO ITS MOUNTING AND THE NEW SETTING IS MADE. THEN THE ACCESS HOLE CAN BE COVERED BY USING A SCREW DRIVER IN THE KEY HOLE AND TURNING CLOCKWISE TO TRIP THE LOCK. SEE PRECEDING PAGE AND MODEL CODE.

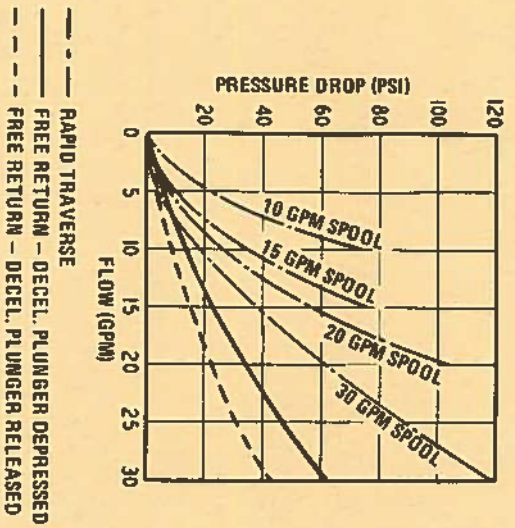
**WEIGHT LBS. (APPROX.)**

PANEL.....24

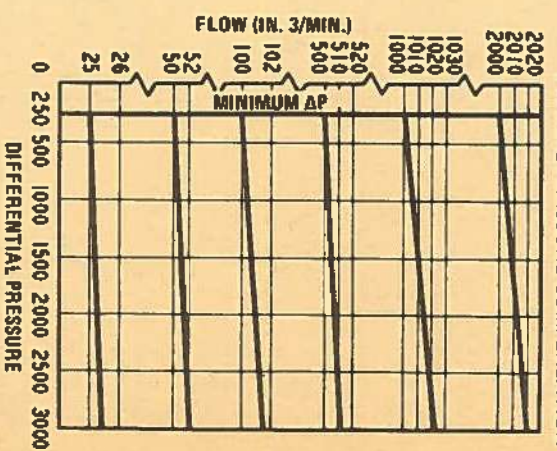


# TYPICAL PERFORMANCE CURVES

## TYPICAL PRESSURE DROP



## TYPICAL PRESSURE COMPENSATION



**MODEL CODE**  
 CP G · 06 · 10 AA · L · T · 11

**CONTROL PANEL**  
 MOUNTING TYPE  
 MANIFOLD  
 NOMINAL VALVE SIZE  
 06 - 3/4"

**DESIGN NUMBER**  
 SUBJECT TO CHANGE.  
 INSTALLATION DIMEN-  
 SIONS REMAIN AS  
 SHOWN FOR DESIGNS  
 10 THRU 19.

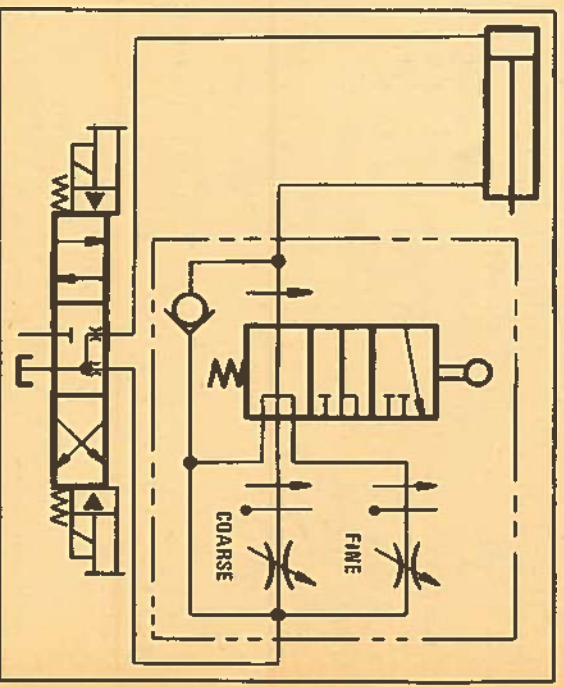
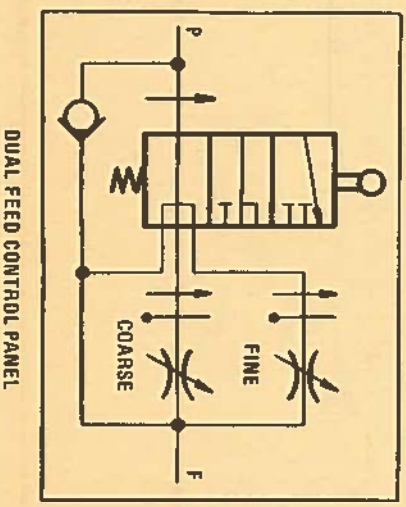
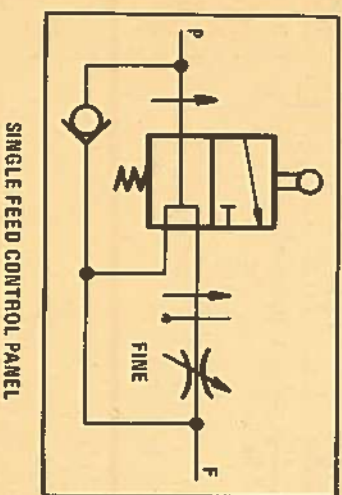
**TRIM ADJUSTMENT OPTION**  
 (OMIT IF NOT DESIRED)

**LOCK OPTION**  
 (OMIT FOR STANDARD LOCK)

**VALVE TYPE**  
 A - SINGLE FEED  
 AA - DUAL FEED

**DECELERATION SPOOL**  
 CAPACITY  
 10 - 10 GPM  
 15 - 15 GPM  
 20 - 20 GPM  
 30 - 30 GPM

# STANDARD GRAPHICAL SYMBOLS FOR FLUID POWER DIAGRAMS



TYPICAL CIRCUIT DIAGRAM



**SPEERY VICKERS**  
T.M.

**CONTROL PANELS**

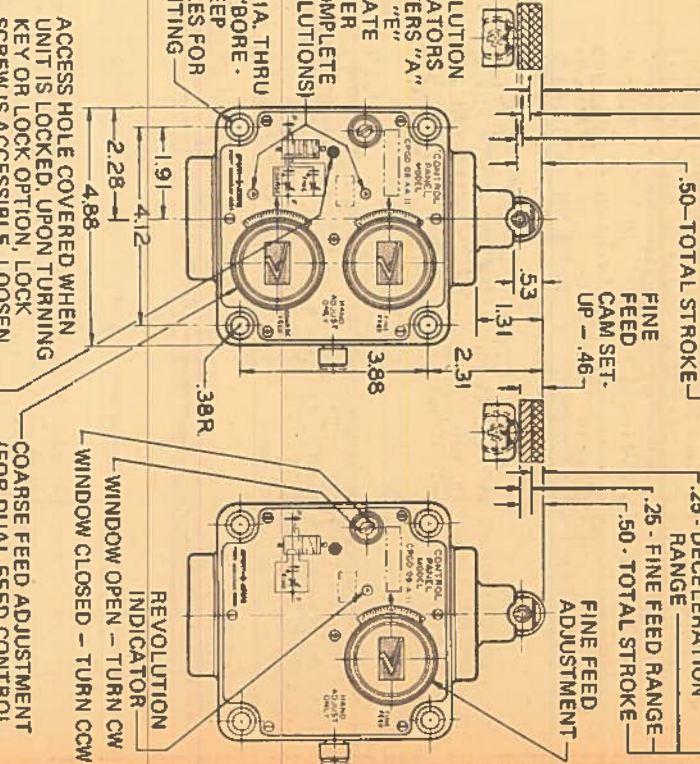
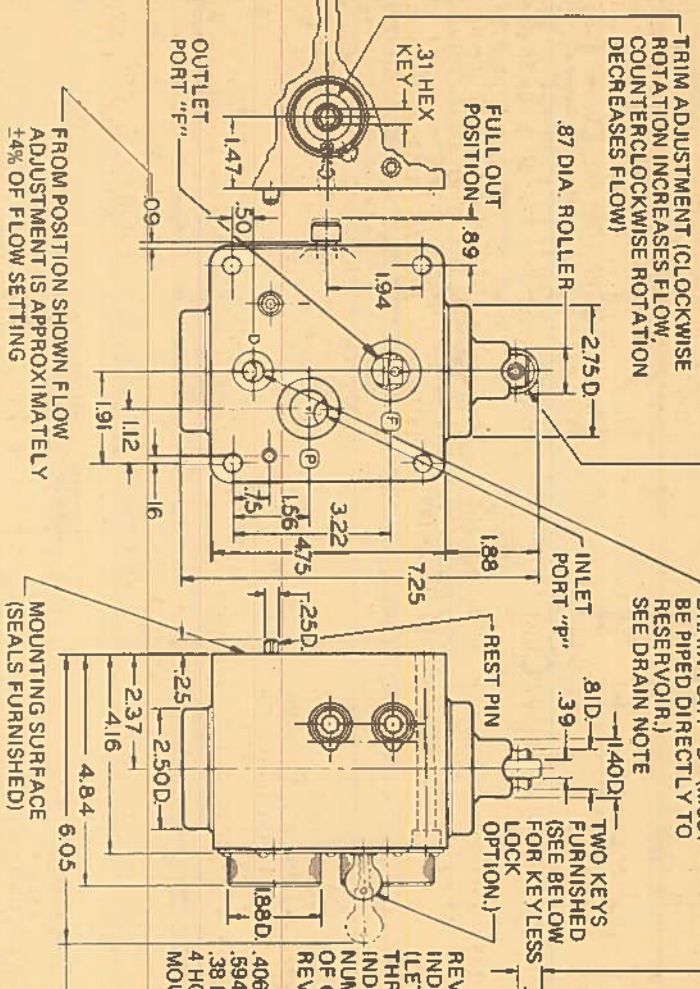
REGENERATIVE, SINGLE AND DUAL FEED  
OR TRI-SPEED MODEL SERIES CPGD-06-\*\*\*-11  
MANIFOLD MOUNTING

**SPEERY VICKERS**  
TROY, MICHIGAN 48064

CONTROL PANELS  
SINGLE AND DUAL FEED  
TEMPERATURE AND PRESSURE COMPENSATED  
3/4" & 1" PIPING  
30 GPM FLOW CAPACITY  
DWG. NO. 519420

**CONVERSION KITS**

TO CONVERT FROM A SINGLE FEED TO A DUAL FEED MODEL (WITH STD. LOCK) ORDER KIT NO. 942250.  
TO CONVERT FROM A SINGLE FEED TO A DUAL FEED MODEL (WITH LOCK OPTION "L") ORDER PARTS FROM SERVICE DRAWING I-3604-S.  
SPRING RETURNS VALVE SPOOL TO EXTENDED POSITION SHOWN (ROLLER CAN BE ROTATED 90°). TAP OUT ROLLER PIN UNTIL ROLLER CAN BE REMOVED. ROTATE PLUNGER 90°, REPLACE ROLLER AND PIN.



REVISED 12-1-78

519420



**MODEL CODE**

CP G D - 06 - 10 AA - L - T - 11

CONTROL PANEL  
MOUNTING TYPE  
MANIFOLD  
REGENERATIVE  
NOMINAL VALVE SIZE  
06 - 3/4"

DESIGN NUMBER  
SUBJECT TO CHANGE.  
INSTALLATION DIMEN-  
SIONS REMAIN AS  
SHOWN FOR DESIGNS  
10 THRU 19.

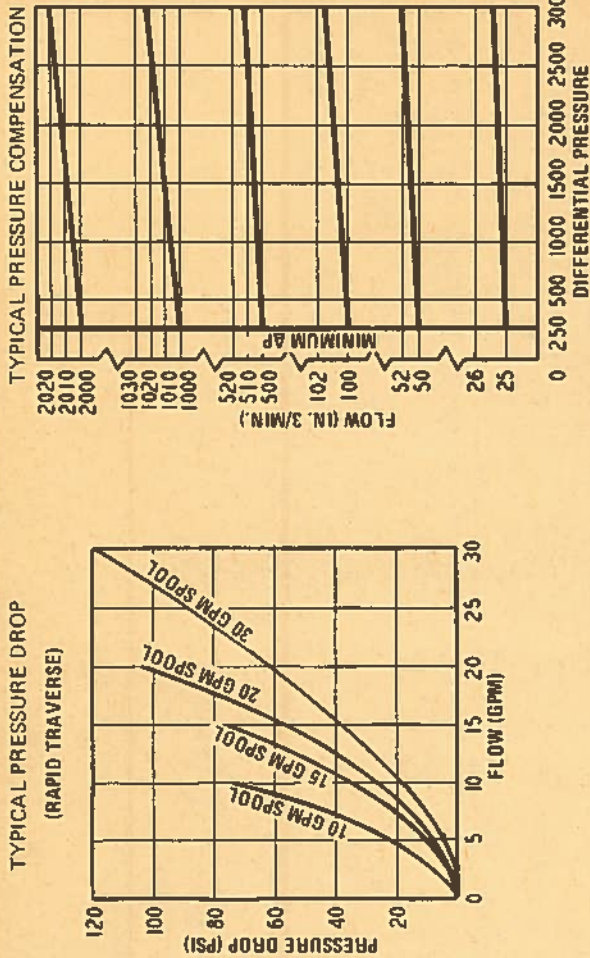
TRIM ADJUSTMENT OPTION  
(OMIT IF NOT DESIRED)

LOCK OPTION  
(OMIT FOR STANDARD LOCK)

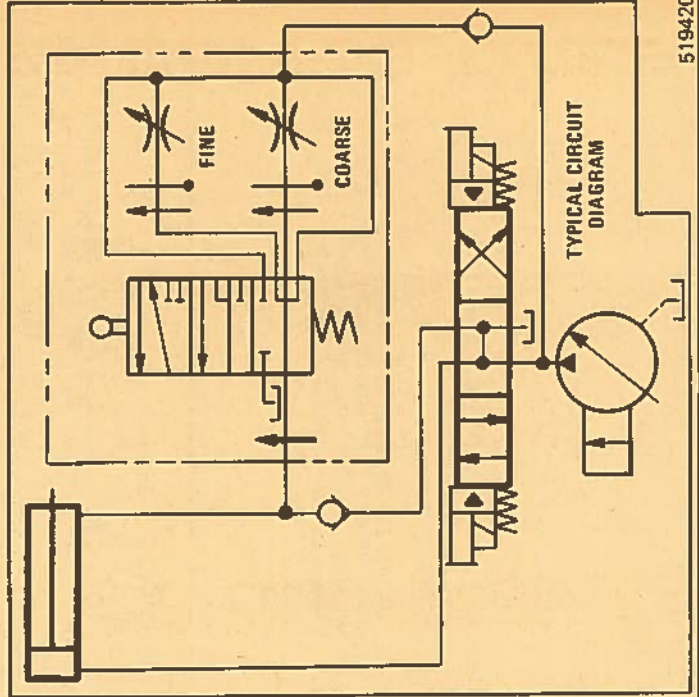
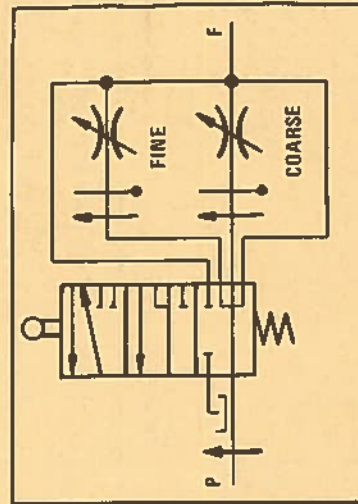
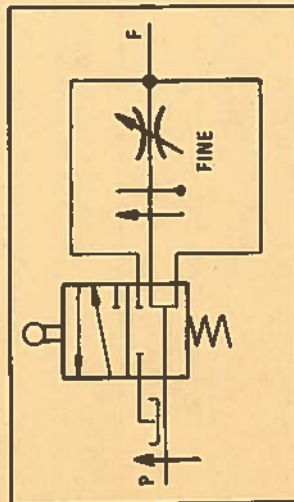
VALVE TYPE  
A - SINGLE FEED  
AA - DUAL FEED

DECELERATION SPOOL  
CAPACITY  
10 - 10 GPM  
15 - 15 GPM  
20 - 20 GPM  
30 - 30 GPM

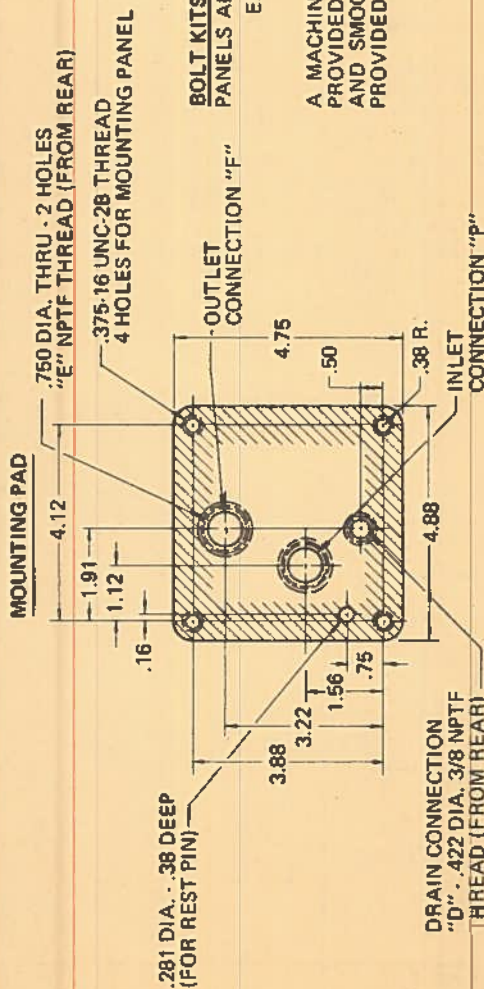
**TYPICAL PERFORMANCE CURVES**



**STANDARD GRAPHICAL SYMBOLS FOR FLUID POWER DIAGRAMS**







**BOLT KITS**  
PANELS AND MOUNTING BOLTS MUST BE ORDERED SEPARATELY.  
EXAMPLE: ONE (1) CPGD-06-10A-11 PANEL  
ONE (1) BKCPG-06-607 BOLT KIT

A MACHINED PAD (AS INDICATED BY SHADED AREA) MUST BE PROVIDED FOR MOUNTING; PAD MUST BE FLAT WITHIN .0005 INCH AND SMOOTH WITHIN 63 MICROINCH. MOUNTING BOLTS, WHEN PROVIDED BY CUSTOMER, SHOULD BE SAE GRADE 7, OR BETTER.

**GENERAL DATA**  
GENERAL USAGE IN REGENERATIVE OIL HYDRAULIC CIRCUITS FOR CONTROLLING RAPID TRAVERSE AND FEED CYCLES.

THIS PANEL IS USUALLY INSTALLED IN METER-OUT CIRCUITS. IN ADDITION TO BEING PRESSURE AND TEMPERATURE COMPENSATED DURING THE FEED PHASES OF THE CYCLE, THE UNIT IS PRESSURE COMPENSATED DURING DECELERATION WHICH OCCURS DURING THE INITIAL 1/4" OF SPOOL MOVEMENT. THE DECELERATION SPOOL MAY BE POSITIONED WITHIN THIS 1/4" BY A CAM TO PROVIDE AN ADDITIONAL FEED OR SPEED RATE. THE NORMAL FEED RATES OCCUR WHEN THE SPOOL IS DEPRESSED THE REMAINING 1/4" OF THE TOTAL 1/2" TRAVEL.

OPERATION OF PANEL IS USUALLY BY CAM. DECELERATION RANGE OF CONTROL PLUNGER DEPENDS UPON VOLUME. OPERATING CAM SHOULD BE ADJUSTABLE TO CONDITIONS. MAXIMUM CAM DEPRESSING ANGLE RECOMMENDED IS 30°. VALVE PLUNGER IS DEPRESSED AGAINST A MAXIMUM SPRING LOAD OF APPROX. 80 POUNDS. IN THE RAPID ADVANCE POSITION RETURN OIL FROM THE CYLINDER IS RETURNED TO THE PUMP OUTLET (REGENERATIVE). THUS A SMALLER DISPLACEMENT PUMP CAN BE USED TO OBTAIN THE SAME CYLINDER RAPID ADVANCE SPEED AS ON A NON-REGENERATIVE CIRCUIT.

FLOW CONTROL ADJUSTMENTS ARE ACCOMPLISHED BY ROTATION OF SELECTOR DIALS. REVOLUTION INDICATORS, LETTERED "A" THRU "E" REGISTERS APPROXIMATELY FOUR (4) REVOLUTIONS FROM FULLY CLOSED TO FULLY OPEN CONDITION (5 CU. IN./MIN. TO 6.50 GPM, COARSE OR FINE FEED DIAL).

MAXIMUM THROTTLE OPENINGS MAY BE LIMITED BY ADDITION OF SPACERS TO THE THROTTLE SHAFT UNDER THE SELECTOR DIALS. SPACERS ARE AVAILABLE FROM SPERRY VICKERS FOR INSTALLATION BY THE USER.

**FILTRATION**..... 25 MICRON

### FLUIDS AND SEALS

ALL PANELS HAVE VITON SEALS (STD.) FOR USE WITH PETROLEUM OIL, PHOSPHATE ESTERS AND ITS BLENDS, WATER-IN-OIL EMULSIONS AND WATER GLYCOL FLUIDS. REFER TO DATA SHEET I-286S FOR HYDRAULIC FLUID AND TEMPERATURE RECOMMENDATIONS.

### TRIM ADJUSTMENT (OPTIONAL)

PERMITS AN ADJUSTMENT OF APPROXIMATELY 14% OF THE FLOW SETTING WHEN VALVE LOCKING DEVICE IS IN A LOCKED POSITION. (CLOCKWISE ROTATION INCREASES FLOW, COUNTERCLOCKWISE ROTATION DECREASES FLOW).

### VALVE LOCKING

A KEY-LOCKING DEVICE IS SUPPLIED WITH THESE VALVES. AN OPTIONAL DEVICE IS ALSO AVAILABLE. INSTEAD OF USING A KEY, THE VALVE IS REMOVED FROM ITS MOUNTING TO OPEN THE ACCESS HOLE, WHICH IS ON THE FRONT OF THE VALVE. THE VALVE IS THEN RETURNED TO ITS MOUNTING AND THE NEW SETTING IS MADE. THEN THE ACCESS HOLE CAN BE COVERED BY USING A SCREW DRIVER IN THE KEY HOLE AND TURNING CLOCKWISE TO TRIP THE LOCK. SEE PRECEDING PAGE AND MODEL CODE.

### WEIGHT LBS. (APPROX.)

PANEL..... 24

NUMBER OF SPACERS	APPROXIMATE MAXIMUM CONTROLLED FLOW (CU. IN./MIN.) USING SPACER PART NO. 211026	
	FINE FEED DIAL	COARSE FEED DIAL
4	100	400
3	300	800
2	700	1200
1	1100	1400

### MAXIMUM FLOW CAPACITY

10, 15, 20 & 30 GPM RAPID TRAVERSE; 13 GPM COARSE FEED METERED; 6.5 GPM FINE FEED METERED.

MINIMUM METERED FLOWS	
OPERATING PRESSURE PSI	APPROX. MIN. FLOW (IN. 3/MIN.)
250	5
500	6
1000	9
1500	12
2000	15
2500	18
3000	20

MAXIMUM OPERATING PRESSURE..... 3000 PSI

MAXIMUM DRAIN PORT PRESSURE..... 50 PSI

ANY PRESSURE AT THE DRAIN PORT ADDS TO THE FORCE REQUIRED TO DEPRESS THE DECELERATION SPOOL BY A FACTOR OF .307 AREA X DRAIN PRESSURE.

MINIMUM PRESSURE DIFFERENCE BETWEEN INLET AND OUTLET PORTS DURING A SPEED CONTROLLED RAPID ADVANCE AND BETWEEN INLET AND DRAIN DURING FEED IS 250 PSI.



# SPERRY-VICKERS CHECK VALVE

MODEL SERIES CSG-825  
MANIFOLD MOUNTING FOR 1-1/4" PIPING

## GENERAL DATA

FOR USE IN OIL HYDRAULIC CIRCUITS WHERE A SPRING CLOSED CHECK VALVE IS REQUIRED TO ALLOW FLOW IN ONE DIRECTION (SEE ARROW) AND TO PREVENT FLOW IN OPPOSITE DIRECTION. INTERNAL PARTS ARE OF HARDENED AND GROUND ALLOY STEEL AS REQUIRED FOR CONTINUOUS HIGH PRESSURE HYDRAULIC SERVICE.

RECOMMENDED WHERE A VALVE IS REQUIRED TO CHECK A HIGH VELOCITY REVERSE FLOW OF FLUID.

MAXIMUM OPERATING PRESSURE RECOMMENDED..... 3000 PSI

NOMINAL FLOW CAPACITY..... 100 GPM  
SEE PRESSURE DROP INFORMATION AT RIGHT.

## CRACKING PRESSURE

MODEL NUMBER	CRACKING PRESSURE PSI
CSG-825	5
CSG-825-S3	50
CSG-825-S8	75

MOUNTING POSITION OF VALVE IS NOT LIMITED BECAUSE OF SPRING CLOSURE CONSTRUCTION.

WEIGHT LBS. (APPROX.)..... 13.5

## PRESSURE DROP INFORMATION

PRESSURE DROP FOR FREE FLOW ACROSS CHECK VALVE	
VOLUME (GPM)	PSI
25	8
50	12
75	16
100	22
125	30

1. THE FIGURES IN THE PRESSURE DROP CHART GIVE APPROXIMATE PRESSURE DROPS ( $\Delta P$ ) WHEN PASSING FLOW OF 100 SSU FLUID(S), HAVING .865 SPECIFIC GRAVITY.

2. FOR ANY OTHER VISCOSITY(S) THE PRESSURE DROP ( $\Delta P_1$ ) WILL CHANGE AS FOLLOWS:

OTHER VISCOSITY(S)	75	150	200	250	300	350	400
% OF ( $\Delta P$ ) FROM TABLE (APPROXIMATE)	93	111	119	126	132	137	141

3. FOR ANY OTHER SPECIFIC GRAVITY ( $G_1$ ) \* THE PRESSURE DROPS ( $\Delta P_1$ ) WILL BE APPROXIMATELY:  $\Delta P_1 = \Delta P (G_1/G)$ .

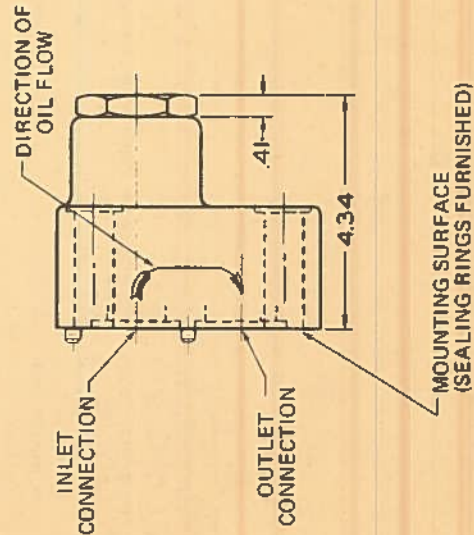
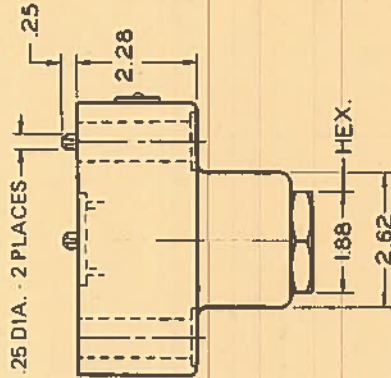
\*SPECIFIC GRAVITY OF FLUID MAY BE OBTAINED FROM ITS PRODUCER. FOR FIRE RESISTANT FLUIDS, THE VALUE IS HIGHER THAN FOR OIL.



# SPERRY-VICKERS CHECK VALVE

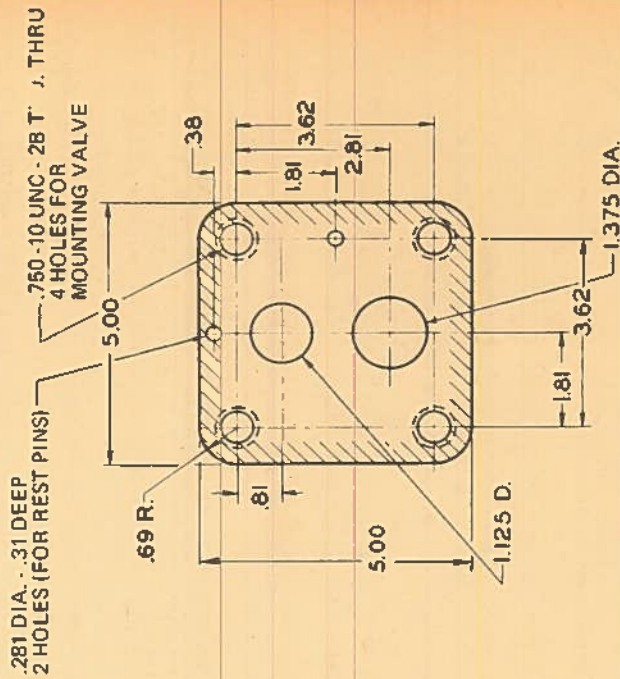
MODEL SERIES C5G-825  
MANIFOLD MOUNTING  
FOR 1-1/4" PIPING

MOUNTING BOLT KITS  
MOUNTING BOLTS MUST BE ORDERED SEPARATELY:  
EXAMPLE: ONE (1) C5G-825 CHECK VALVE  
ONE (1) BKG10-616 MTG. BOLT KIT



MOUNTING SURFACE  
(SEALING RINGS FURNISHED)

## MOUNTING PAD

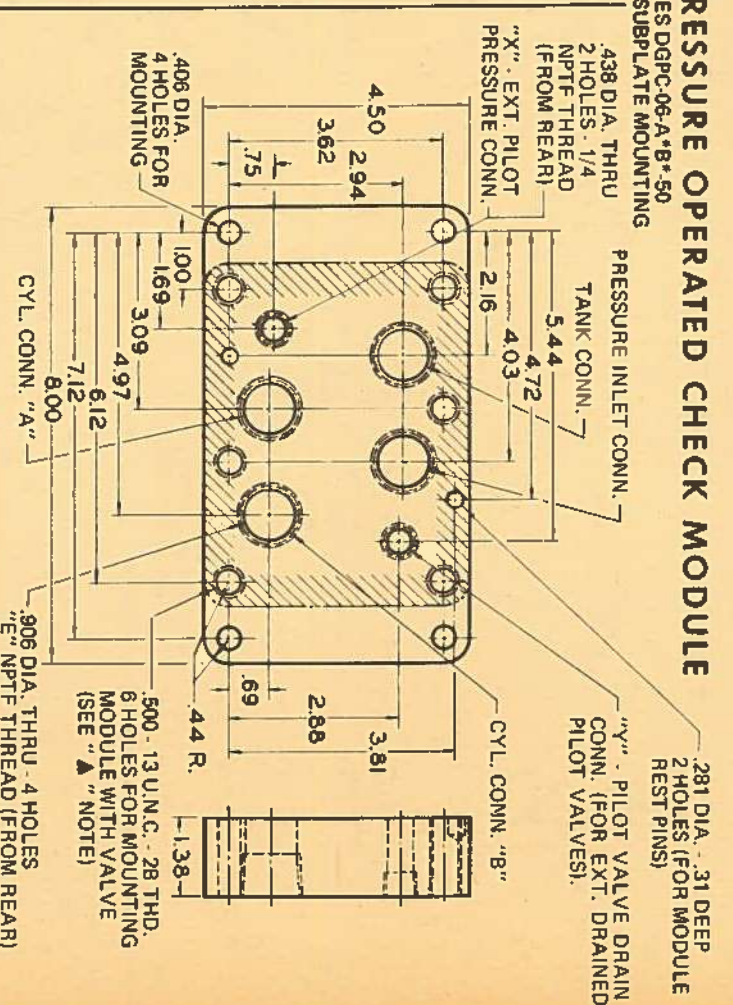
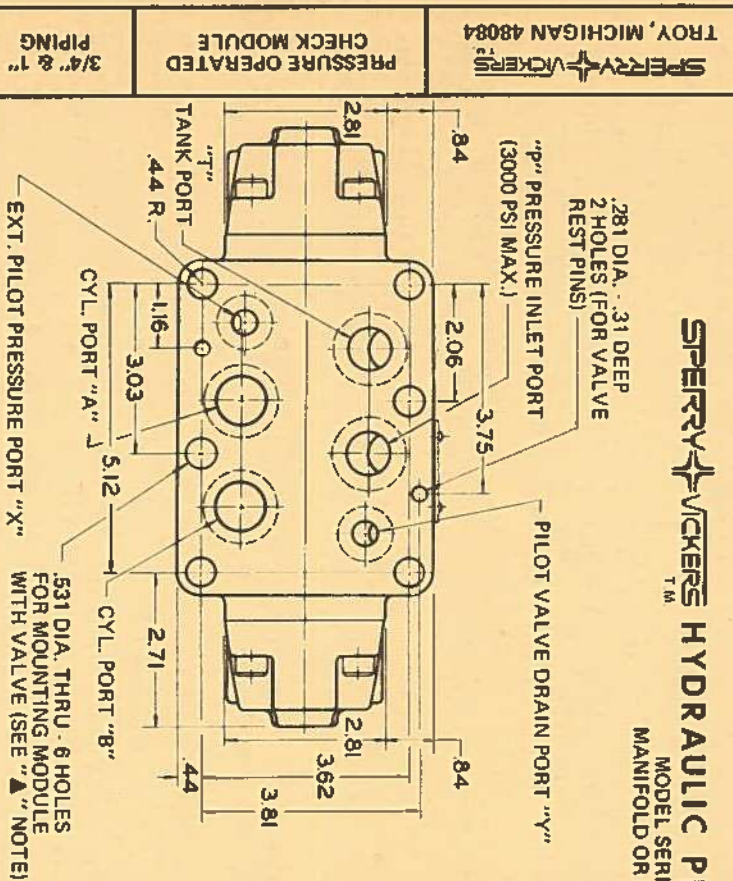


A MACHINED PAD (AS INDICATED BY SHADED AREA) MUST BE PROVIDED FOR MOUNTING; PAD MUST BE FLAT WITHIN .0005 INCH AND SMOOTH WITHIN 63 MICROINCH. MOUNTING BOLTS, WHEN PROVIDED BY CUSTOMER, SHOULD BE SAE GRADE 7, OR BETTER.



# **SPIERDY VICKERS<sup>TM</sup> HYDRAULIC PRESSURE OPERATED CHECK MODULE**

MODEL SERIES DGPC-06-A\*8\*50  
MANIFOLD OR SUBPLATE MOUNTING



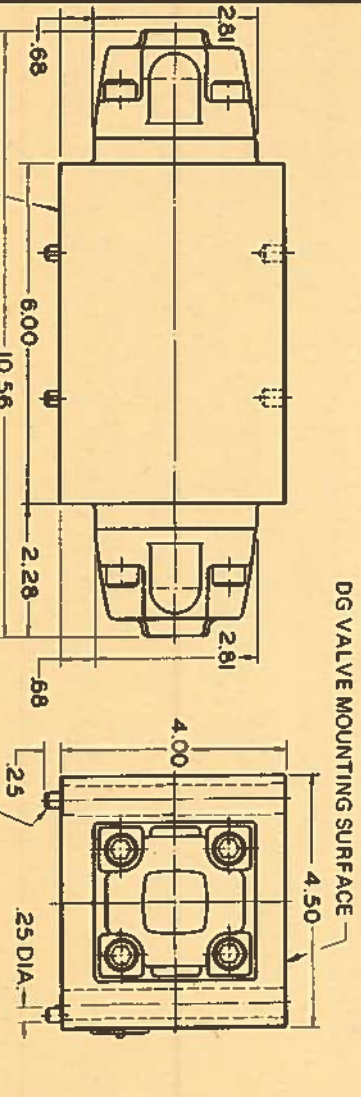
SUBPLATE	"E" NPTF	WEIGHT
MODEL NUMBERS	THREAD	(APPROX.)
DGSM-06-50	3/4"	11 LBS.
DGSM-06X-50	1"	

**MOUNTING SUBPLATES & BOLT KITS**  
VALVES, MODULES, SUBPLATES AND MOUNTING BOLTS MUST BE ORDERED SEPARATELY.

**EXAMPLE:** ONE (1) DGSM-06-50 VALVE  
ONE (1) DGPC-06-A\*8-50 MODULE  
ONE (1) DGSM-06-50 SUBPLATE  
ONE (1) BKDGPC-06-882 BOLT KIT

**NOTE:** SIDE CONNECTION SUBPLATES ARE ALSO AVAILABLE WITH 3/4" & 1" PIPE THREADS. SEE DRAWING NO. 522600.

**NOTE:** WHEN SUBPLATE IS NOT USED, A MACHINED PAD (AS INDICATED BY SHADED AREA) MUST BE PROVIDED FOR MOUNTING. PAD MUST BE FLAT WITHIN .0005 INCH AND SMOOTH WITHIN 63 MICROINCH. MOUNTING BOLTS, WHEN PROVIDED BY CUSTOMER, SHOULD BE SAE GRADE 7, OR BETTER.





**GENERAL DATA**  
THESE MODULES CONTAIN A CHECK VALVE IN BOTH CYLINDER PORTS. THEY ARE ARRANGED FOR FREE FLOW OUT OF THE DG, DIRECTIONAL VALVE.

FOR RETURN FLOW, ONE CHECK CAN BE UNSEATED BY A COMMON STRIKER PISTON MOUNTED CO-AXIALLY BETWEEN THE TWO CHECKS. THIS HAPPENS WHEN INTERNAL PRESSURE ON ONE SIDE IS SUFFICIENT TO CAUSE THE STRIKER PISTON TO OPEN THE CHECK VALVE ON THE OPPOSITE SIDE. IN A NEUTRAL CONDITION (WITH CYLINDER PORTS OPEN TO TANK AT THE DIRECTIONAL VALVE) COMPRESSION SPRINGS WILL SEAT THE CHECKS AND THE MACHINE ACTUATOR WILL BE HELD STATIONARY.

WITHIN EACH POPPET PISTON IS A SMALL DECOMPRESSION POPPET WHICH OPENS BEFORE THE MAIN CHECK VALVE. (AVAILABLE WITHOUT DECOMPRESSION POPPET ON REQUEST.)

**OPENING RATIOS**  
DECOMPRESSION POPPET..... 34:1:1  
CHECK..... 2.2:1

**CRACKING PRESSURES**  
(EACH CHECK)..... 30 PSI  
(OTHER CRACKING PRESSURES AVAILABLE ON REQUEST)

**FLOW CAPACITY**  
RATED..... 35 GPM  
MAXIMUM (RECOMMENDED)..... 60 GPM

**PRESSURE**  
MAXIMUM INLET PRESSURE..... 3000 PSI

**DIRECTIONAL VALVE**  
DIRECTIONAL VALVE TYPES WITH CYLINDER PORTS OPEN TO TANK IN CENTER POSITION ARE RECOMMENDED. (SPOOL TYPES 0-6-9 AND 39). THE DGPC MODULE IS NOT USABLE WITH PRESSURE CENTERED OR DG18 AIR OPERATED VALVES.

**DRAIN**  
DRAIN CONNECTION "Y" MUST BE PIPED DIRECTLY TO TANK THROUGH A SURGE FREE LINE SO THERE WILL BE NO BACK PRESSURE AT THE VALVE DRAIN PORT. TRANSCIENT PRESSURE MUST NOT EXCEED 5 PSI.

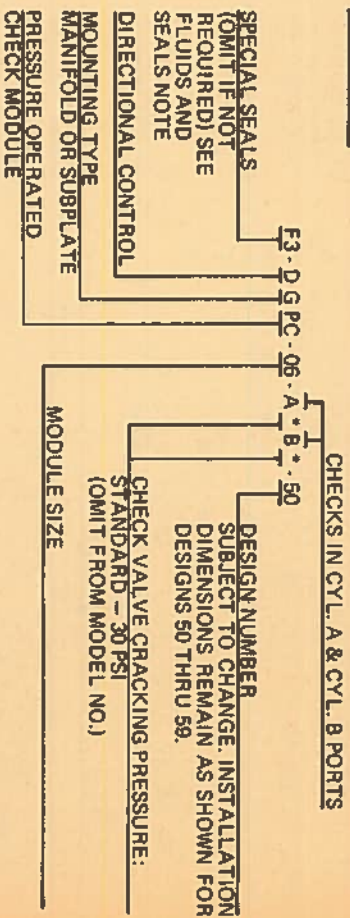
**PRESSURE DROP (APPROX.)**  
THROUGH THE MODULE AT 35 GPM AND 100 SSU IS 100 PSI NOT INCLUDING THE CHECK CRACKING PRESSURE (TOTAL DROP P TO A PLUS B TO T).

**FLUIDS AND TEMPERATURES**  
AN OIL VISCOSITY RANGING BETWEEN 150 SSU (LIGHT) AND 225 SSU (MEDIUM) AT 100° F. FOR AMBIENT TEMPERATURES ABOVE 85° F. IS RECOMMENDED. REFER TO DATA SHEET 1-2863 (SECTION L) FOR HYDRAULIC FLUID AND TEMPERATURE RECOMMENDATIONS.

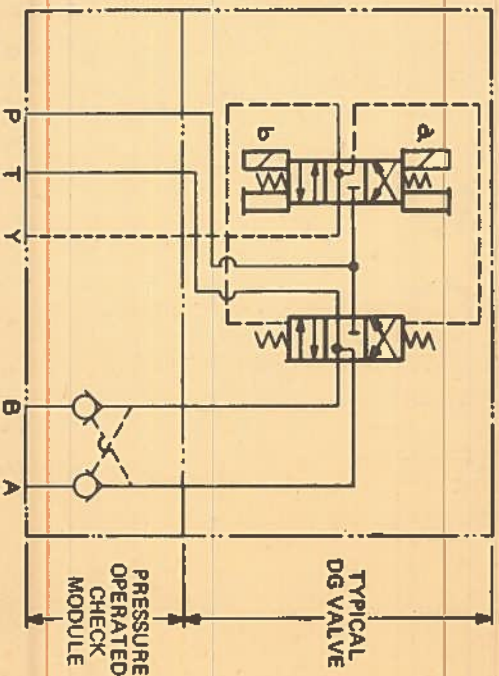
**FLUIDS AND SEALS**  
THE USE OF SYNTHETIC, FIRE RESISTANT FLUIDS REQUIRES THE USE OF SPECIAL SEALS (SEE MODEL CODE). WATER GLYCOL, WATER-IN-OIL EMULSIONS AND PETROLEUM OIL MAY BE USED WITH STANDARD SEALS.

**NOTE**  
FOR FURTHER INFORMATION ON INSTALLATION, RATINGS, AND PERFORMANCE DATA, REFER TO DRAWING OF DIRECTIONAL VALVE USED WITH THIS MODULE.  
MOUNTING BOLT KITS USED WITH DG VALVES AND TWO OR THREE MODULES ARE LOCATED IN THE ACCESSORY SECTION L.

**MODEL CODE**



**GRAPHICAL SYMBOL (DG VALVE WITH MODULE)**

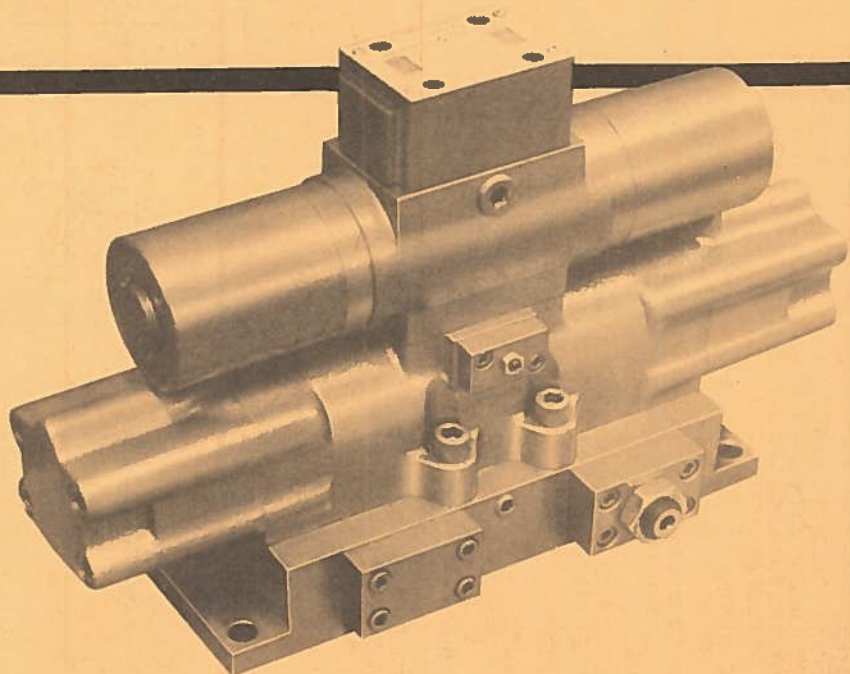




# SALEM DIRECTIONAL CONTROL VALVES

Designed for High Water Base Fluids, Water with Soluble Oil, Oil and Air Systems.

SALEM directional control valves are ruggedly constructed for the rigors of operation in the Primary Metals Industries. Synthetic sealing members and chrome plated plungers offer zero leakage and long service life. SALEM products thus complement the world recognized reputation of Sperry Vickers products for quality and serviceability.



## SALEM

**Direct Solenoid  
Pilot Operated  
Model 76-1500 &  
3000 P.S.I.  
Hydraulic  
Directional  
Control Valves**



# To Cover The Complete Range Of Fluid Power Control Applications, Specify.....



## PNEUMATIC VALVES

Ruggedly constructed of aluminum and stainless steel, this wide range of Salem Pneumatic Valves is rated for operating pressures of 50 to 125 PSIG when solenoid pilot operated and 0 to 150 PSIG when external pilot or lever operated. 1/2" and 1" basic sizes utilize quickly replaceable 1-piece cartridges to retain all internal O-ring seats.

Uniquely engineered sub-base of 1/2" valves permit removal of main valve assembly without disturbing air or electrical connections. Sub-bases for 1/2", 1" and 1 1/4" basic sizes are combination tapped side and bottom for greater piping convenience.

Standard valves are sub-base mounted or foot mounted with tapped housings. Special porting and mounting configurations are available to meet customer requirements.

## HIGH PRESSURE HYDRAULIC VALVES



For use with water, water-soluble oil and oil hydraulic systems, the wide range of sizes and styles have been engineered for "ease of maintenance". Removal of cap screws provides rapid access to internal parts. All packing seats are non-corrosive (stainless steel and brass) and all internal parts (except plungers) are interchangeable within a given valve size thus reducing spare parts inventory.

Actuator interchangeability within a given size range is an important design feature of the three way and four way valves. This allows housing sub-assemblies to be used as two or three position valves when operated by either a lever or pilot cylinder.

Standard valves are sub-base mounted or foot mounted with tapped housings. Special porting and mounting configurations are available to meet customer requirements.

## LOW PRESSURE HYDRAULIC VALVES



Excellent for use with water, oil, or water soluble oil at pressures to 350 PSIG, these valves may also be used on rugged air applications at pressures to 250 PSIG. Valve housings are made from brass in sizes through 3" and from cast Meehanite in sizes through 8". Interchangeable separators are made from brass, all plungers are 416 stainless steel.

Solenoid pilot operators require 50 to 125 PSI air as the pilot medium. Used on 110 volt, 60 cycles the INRUSH current—.61 Amps and the HOLDING current—.12 Amps.

## HYDRAULIC PILOT OPERATED DESCALING VALVES



The Revised SALEM Descaling Valve design conserves space (prox. 20% shorter) and provides adjustable shifting speed control of the main valve

plunger thus dramatically reducing hydraulic shock when opening and closing the valve. Mill service water at 150 to 300 psi is the pilot medium. The valve incorporates corrosion resistant packing seats, fewer internal parts, precision end-to-end plunger alignment, and external plunger position indicators. Information concerning the availability of a low pressure pilot system and air pilot operated valves is available upon request.

SIZE Pipe dia. (Inches)	MAX. PRESSURE (PSI) ●	FLOW RATE (GPM)
4	2500	689
6	2500	1225
8	2500	2070

# SALEM

## HYDRAULIC AND PNEUMATIC VALVES

### MODEL 142 ALUMINUM CONSTRUCTION—125 PSIG

SIZE Pipe dia. (Inches)	TAP SIZE (Inches)	FLOW-DIRECTION			OPERATOR			POSITION		MOUNTING
		2-Way	3-Way	4-Way	Solenoid Pilot	Remote Pilot	Lever	Two	Three	
1/2	3/8-1/2	●	●	●	●	●	●	●	●	Combination side & bottom ported
1	3/4-1	●	●	●	●	●	●	●	●	Combination side & bottom ported
1 1/4	1-1 1/4	●	●	●	●	●	●	●	●	Combination side & bottom ported
1 1/2	1 1/2	●	●	●	●	●	●	●	●	Bottom Ported
2	2	●	●	●	●	●	●	●	●	Bottom Ported

MANUAL OVERRIDES AND SUB BASES ARE STANDARD ON ALL MODELS.

### MODEL "105"—1500 PSI

### MODEL "108"—4000 PSI

SIZE Pipe dia. (Inches)	MAX. Pressure (PSI)	FLOW RATE (GPM)	FLOW-DIRECTION			OPERATOR		POSITION		MOUNTING
			2-Way	3-Way	4-Way	Lever	Pilot	Two	Three	
1/2	1500 4000	10.0 5.8	●	●	●	●	●	●	●	With or without subplate
3/4	1500 4000	29.8 17.3	●	●	●	●	●	●	●	With or without subplate
1	1500 4000	55.2 35.8	●	●	●	●	●	●	●	With or without subplate
1 1/4	1500 4000	82.5 49.0	●	●	●	●	●	●	●	With or without subplate
1 1/2	1500 4000	119.5 76.5	●	●	●	●	●	●	●	With or without subplate
2	1500 4000	184.0 139.5	●	●	●	●	●	●	●	With or with subplate or flanged
3	1500 4000	405.0 337.0	●	●	●	●	●	●	●	Flanged
4	1500 4000	788.0 660.0	●	●	●	●	●	●	●	Flanged
6	1500 4000	1350.0 1225.0	●	●	●	●	●	●	●	Flanged

### MODEL "133" BRASS OR CAST MEEHANITE CONSTRUCTION—350 PSIG

SIZE Pipe dia. (Inches)	TAP SIZE (Inches)	FLOW RATE (GPM)	FLOW-DIRECTION			OPERATOR			POSITION		MOUNTING
			2- Way	3- Way	4- Way	Solenoid Air Pilot	Remote Air Pilot	Lever	Two	Three	
1¼	1-1¼	84	●	●	●	●	●	●	●	●	Combination side & bottom ported
1½	1½	127	●	●	●	●	●	●	●	●	Bottom ported
2	2	208	●	●	●	●	●		●	●	Bottom ported
3	2½-3	460	●	●			●			●	Pipeline (tapped)
4	4	780	●	●			●			●	Flanged
6	6	1350	●	●			●			●	Flanged
8	8	2575	●				●			●	Flanged

## STRAINERS



Salem strainers may be used with water, water-soluble oil and oil. All internal parts are non-corrosive.

Hardened stainless steel strainer rings resist the peening effect of particles in the fluid which tend to close the critical flow path. The unique basket design eliminates close tolerances and reduces re-assembly time after cleaning.

SIZE Pipe dia. (Inches)	MAX. PRESSURE (PSI) ●	FLOW RATE (GPM)
4	2500	800
6	2500	1350
8	2500	2700

Standard particle size—.027  
Smaller particle size available

● 3000 PSI units available upon request.

SPERRY VICKERS

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4-Way 2-Position Double Solenoid Valve (3/8")	775-331-504-100	j - 5
4-Way 3-Position Double Solenoid Valve (3/8")	775-331-540-100	j - 6
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Strainer (6")	127-EE1-000-300	j - 44

**MODEL CODES**

Model codes in this catalog list many options. Some possible model combinations are not readily available. Please contact your Sperry Vickers representative to verify availability.

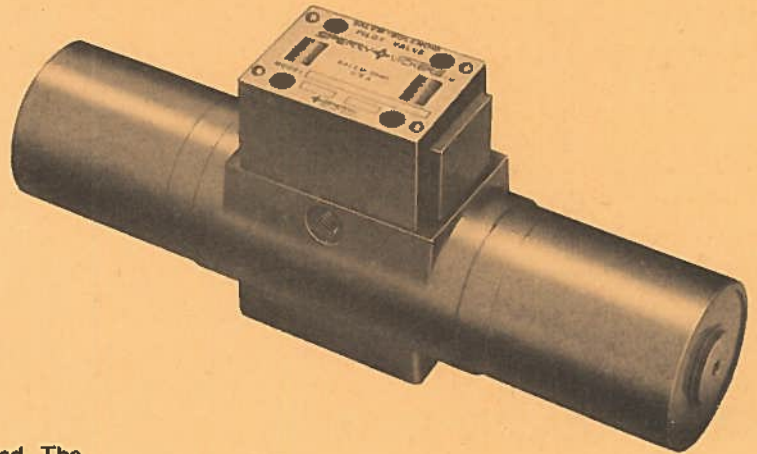


# NOTES



*The unique new pilot valve to use  
with water, water-soluble oil, or oil,  
without any external pilot source...*

# Salem Model 76



## Features/Benefits

### DIRECT SOLENOID OPERATION

No external pilot source (air, fluid, etc.) is required. The Model 76 valve uses system fluid to shift plungers (spools) in the main valve. Time and money required to plumb and maintain an external pilot source are eliminated.

### PACKED PLUNGER DESIGN

The Model 76 valve uses a resilient seal and a moving chrome-plated ported plunger to effect valving action. A minimum number of seals are used, and all dynamic seals are in complete hydraulic balance. As a result, leakage is zero at start-up.

### WET-PLUNGER SOLENOIDS

The use of wet-plunger DC solenoids results in improved reliability and service life, reduced solenoid operating temperature, and increased efficiency.

The chance of coil burnout due to "jamming" of the valve plunger by dirt in the hydraulic system is eliminated, thus minimizing costly downtime. Use of wet-plunger DC solenoids also eliminates the need for plunger O-rings to seal between a pressure chamber and atmospheric pressure, thereby getting rid of the major cause of external pilot valve leakage as found in other pilot valve designs.

### MANUAL OVERRIDES

Overrides in the end of each solenoid allow manual valve operation for setup and troubleshooting. Solenoids are of the pull type so the opposite end override must be used to shift the plunger for simulation of solenoid operation.

### INDICATOR LIGHTS

This standard feature provides a fast method of troubleshooting the electrical circuit. The lights illuminate when there is voltage at the solenoids.

### SIMPLIFIED MAINTENANCE

Maintenance time and cost are reduced through the use of plug-in solenoids, a minimum number of internal parts, readily accessible bolting, and easy O-ring replacement. All dynamic seals are retained in removable packing cartridges for quick replacement. Spring cartridges prevent flying springs during valve disassembly. Internal valve parts are symmetrical for ease of assembly.

### ADAPTABLE MOUNTING

Model 76 valves fit all existing Salem SS-99 directional control valves with a change in the pilot flow control base and, as such, are available as a pilot and base assembly. The standard 1/4" NFPA mounting surface of all Model 76 valves facilitates installation on directional controls other than Salem, thus providing the means to achieve a greater value package. Model 76 valves can also be used by themselves as directional controls in 3/8", 1/2", and 3/4" port sizes.

Sperry Vickers' flow regulator sandwich plate, model DGFN-01-20, can be used between the Model 76 valve and a manifold or subplate. The plate regulates the flow rate between the valve and a hydraulic actuator. It permits free flow to either actuator port, and adjustable independent flow regulation in each return line from the actuator. The sandwich plate and/or subplates can be ordered by using Salem part numbers in the "valve mounting bases" chart on the last page of this brochure.



# Specifications

Rated Flow..... 5 GPM\*

Electrical Service..... 115 and 230 Volt  
50 and 60 Hz

Rated Pressure..... 1500 and 3000 PSI

A solid state SCR switch converts AC electrical signals to DC by applying full line voltage to solenoid coil for .5 second to shift pilot valve plunger. Voltage then reduces to level required to hold valve energized. Maximum required amperage is 3 amps.

Maximum Exhaust Pressure..... 1000 PSI, Cyclic  
1500 PSI, Static

Inrush Current..... 4.5 Amps  
Holding Current..... 0.58 Amps  
Re-energization of same solenoid requires a minimum delay of 20 milliseconds. No delay required between energization of opposite solenoids.

Maximum Cycle Rate..... 60 Cycles Per Minute  
(One cycle is actuation of valve plunger and its return to original position.)

\*Consult factory for flow rates between 5 and 9 gpm.

## Valve Comparisons

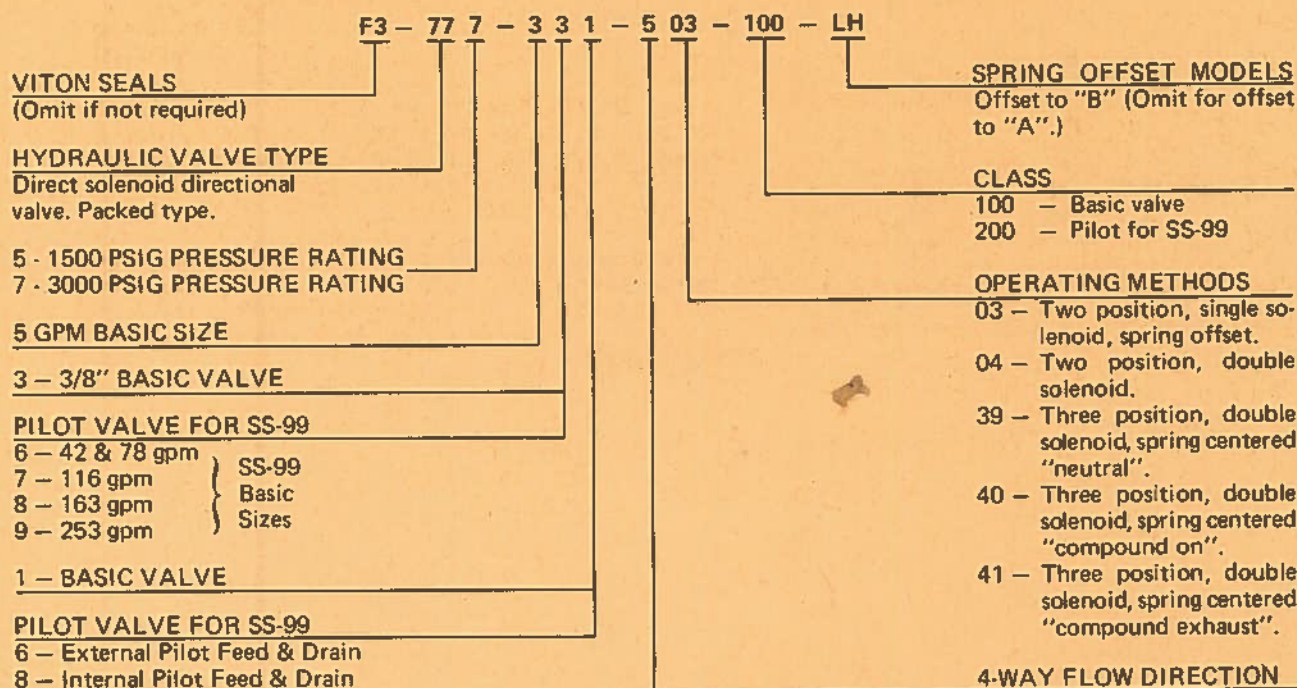
Highly reliable and easy to maintain, Salem valves match or surpass construction and operational features offered in competitive units. As an aid to valve selection, the following chart compares the Salem Model 76 valve to pilot valves of other manufacturers.

ITEMS OF COMPARISON	VALVES				
	SALEM	HUNT	NORDBERG	REPUBLIC	LACH
Spring Centered Plunger	Yes	Yes	No	Yes	No
Packed Plunger Design	Yes	Yes	Yes	No	Yes
Balanced Seals	Yes	Yes	No	●	No
Seals on Plunger	3	4	6	●	8
Seals in Housing Bore	4	4	6	●	6
External Leakage	No	No	Yes	Yes	Yes
Dirt Tolerance	Good	Fair	Good	Fair	Fair
Cartridge Construction	Yes	Yes	Yes	No	Yes
Plain Water Use	Yes	Yes	Yes	No	Yes
Air Pilot	No	No	Yes	No	Yes
Hydraulic Pilot	No	No	No	No	No
Direct Solenoid	Yes	Yes	No	Yes	No
Amperage Required	Low	Low	Low	High	Low
Plug-In Solenoid Coils	Yes	Yes	No	No	No
No. of Coils for Double Solenoid - 2 & 3 Position	2	2	2	2	2

● Metal-to-Metal



# Model Code



## Valve Mounting Bases

The following chart lists mounting subplates and the flow regulator sandwich plate described in the "adaptable mounting" section. Use Salem part number to order.

SPERRY VICKERS SUBPLATE MODEL NUMBER	NPTF PORT SIZE	PORT LOCATION	SPERRY VICKERS INSTALLATION DRAWING NUMBER	SALEM PART NUMBER
DGSM-01X-10	3/8"	Bottom	517401A	76-234488
DGSME-01X-10	3/8"	Side	522600	76-282265
DGSM-01Y-10	1/2"	Bottom	517401A	76-221212
DGSME-01Y-10	1/2"	Side	522600	76-282264
DGSM-01Z-10	3/4"	Bottom	522590	76-316601
DGFN-01-20	Flow Regulator Plate		522580A	76-286120

**NOTE:** Take care to use correct bolt lengths when mounting Model 76 pilot on any installation other than Salem SS-99 directional valve. Although Model 76 valves have standard NFPA 1/4" mounting, and NFPA interfaces are identical, Model 76 valves require longer bolts (3")

than conventional Sperry Vickers DG4S4 directional valves. This, coupled with various flow control bases on the market, requires caution in determining and ordering bolts of proper length.

Measure the value of a supplier by all he supplies above and beyond a quality product. Sperry Vickers measures up.

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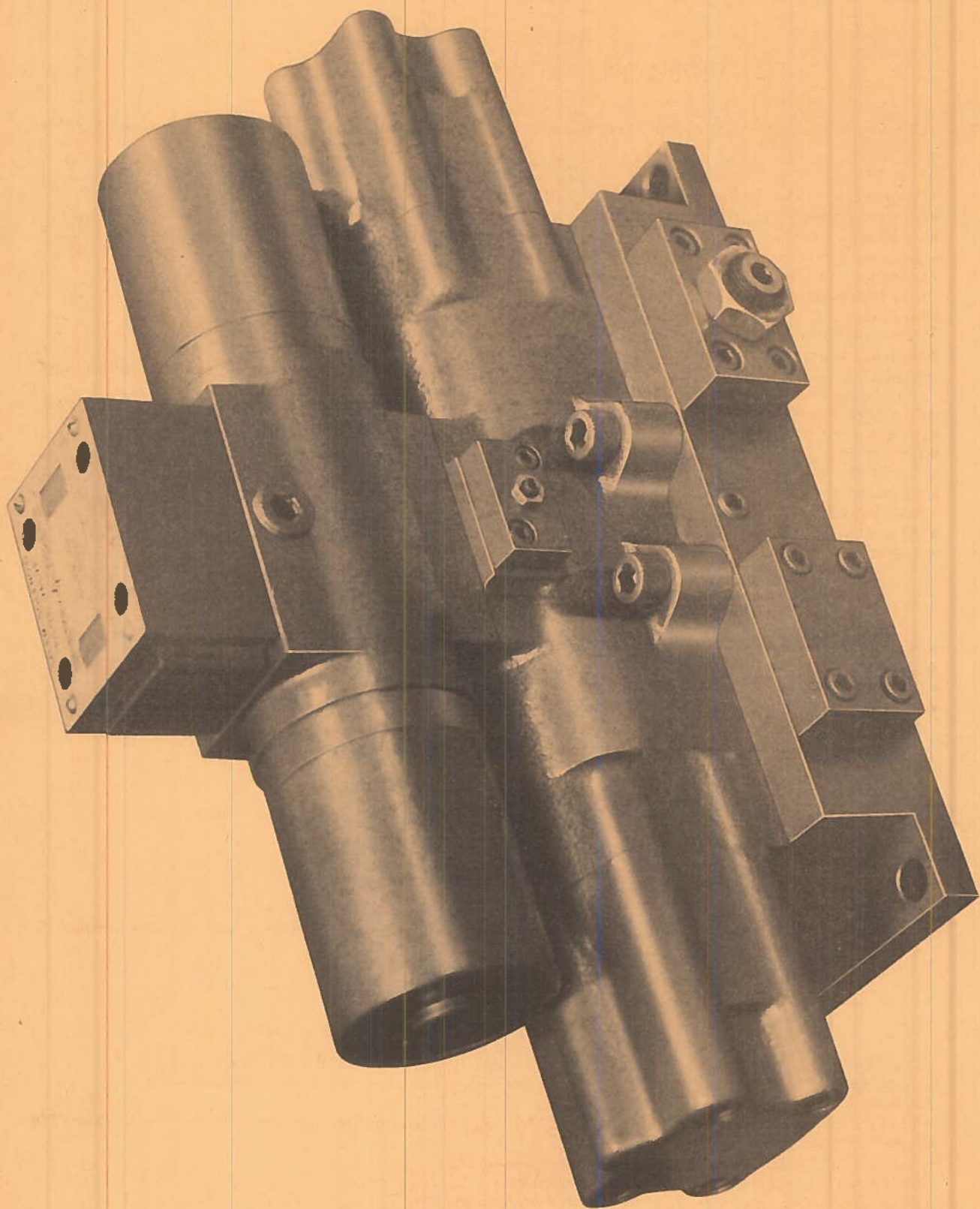














**SALEM MODEL 76**  
**HYDRAULIC DIRECTIONAL CONTROL VALVE**

The following outline summarizes the main features of the new Salem Model 76 line of high pressure valves.

**GENERAL FEATURES**

- Modern single "Packed Plunger" design for high water base fluids.
- Direct D.C. solenoid — Hydraulic pilot operated or oil hydraulic.
- No pilot air required.
- Balanced dynamic seals, zero leakage operation.
- Compact size — less weight.
- Easy maintenance modular cartridge construction.
- Five ratings: 5, 35, 60, 150 and 300 GPM at 1500 and 3000 PSI pressure ratings.
- Minimum pressure drop.
- Moderate internal flow velocities at rated flows for long valve life.
- Available in 3/8" through 3" NPTF port connections combination socket weld/tapped sub-base connections-standard. Bases for manifold mounting also available.
- Four-way — two and three position — single and double solenoid actions available — see data sheet 77-1.
- Integral pilot flow control to control valve shift speed — standard for system shock control.
- Zero external plunger leakage — normal seal wipeage drained internally to tank or externally to sump.
- Corrosion resistant sealing surfaces for improved seal and valve life.
- Adaptable to other SALEM and competitor mounting bases by use of adaptor plates.
- Patented solid state switch with replaceable indicator light module.
- Symmetrical construction — parts interchangeability.
- Available for 115 and 230 volt, 50 and 60 Hz. operation.

**MATERIALS OF CONSTRUCTION**

**5 GPM and Pilot Valve — Models 775 & 777**

- Housing and Sleeve — High strength aluminum with special abrasion resistant surface treatment.
- End-Cap — single solenoid — anodized aluminum.
- Plunger — Hard chrome plated 416 stainless steel.
- Seals — Static — Buna N (Nitrile)  
Back-up rings — Teflon  
Dynamic — 1500 PSI — Buna N  
3000 PSI — Teflon
- Solenoid Armature — Steel
- Spring Cartridges — Steel
- Springs — Cadmium plated steel
- Override Stems — Stainless steel
- See Bulletin — 770179 for additional details

**MAIN STAGE**

- Housing and Pilot Caps — Grade 60-45-15 Ductile Iron — All sealing surfaces have Chrome Carbide infiltration treatment for abrasion and corrosion resistance that features:
  - a. Surface build-up of less than .0002 in.
  - b. Hardness value — Rockwell "C" 70-72.
  - c. Will not chip, peel, crack or flake.
  - d. Increased wear resistance.
- Sleeves — Case hardened Steel with Chromium carbide infiltration treatment on all surfaces.
- Cartridges — Manganese Bronze with Chromium Carbide surface treatment on O.D. sealing surfaces.
- Plunger — hard chrome plated 416 stainless steel.
- Seals-Buna N (nitrile) (static & dynamic) 1500 PSI: Special polyurethane dynamic — Buna N static - 3000 PSI
- Back-up rings — Teflon (Static & Dynamic).
- Pistons — 416-T Stainless Steel, Hard chrome plated on O.D.
- Pilot Flow Control Needles — Case Hardened Steel.
- Pilot Flow Control Sleeves — Heat treated 416 stainless steel.
- Main Valve Flow control needle — Case hardened steel.
- Main Valve Flow control sleeve — 440 Case hardened stainless steel.
- Main Valve Flow control spring — Cadmium plated steel.
- Main Valve Flow control miscellaneous parts — C.H. Steel.



**SPERRY VICKERS – SALEM VALVE**  
**Model 76 Available Actions and Flow Control Options**

**All Models – Four Way**

Model Number	Description	Action	Model Number	Description	Action
<b>Two-Position Models</b>					
77#-***-564-2*0	Single Solenoid 1 to 3, 4 to 2		77#-***-565-2*0	Double Solenoid 1 to 4, 3 to 2	
<b>Three-Position – Double Solenoid Models</b>					
77#-***-561-2*0	Return to Neutral All Ports Blocked		77#-***-5**-2*0	3 to 2, 1 & 4 Blocked	
77#-***-562-2*0	Ret. to Neutral-Comp. Exh. 1 Blocked – 3 & 4 to 2		77#-***-5**-2*0	4 to 2, 1 & 3 Blocked	
77#-***-563-2*0	Ret. to Neutral-Comp. On 2 Blocked – 1 to 3 & 4		77#-***-5**-2*0	1 to 3, 2 & 4 Blocked	
77#-***-5**-2*0	All Ports Open		77#-***-5**-2*0	1 to 3 & 2, 4 Blocked	
77#-***-5**-2*0	1 to 4, 2 & 3 Blocked		77#-***-5**-2*0	1 to 4 & 2, 3 Blocked	

Select From Code Key P 1073-C  
 Pressure Rating – #  
 Valve Size & Mounting – \*\*\*  
 Model Number To Be Assigned – \*\*  
 Flow Control Option – \*



**FLOW CONTROL LOCATIONS**

-110-	In & Out Cyl. 4		-160-	In Cyl. 4 Out 3	
-120-	In & Out Cyl. 3		-170-	In Cyl. 3	
-130-	Out Cyl. 3 & 4		-180-	In Cyl. 4	
-140-	In Cyl. 3 & 4		-190-	Out Cyl. 3	
-150-	In Cyl. 3 Out 4		-1A0-	Out Cyl. 4	

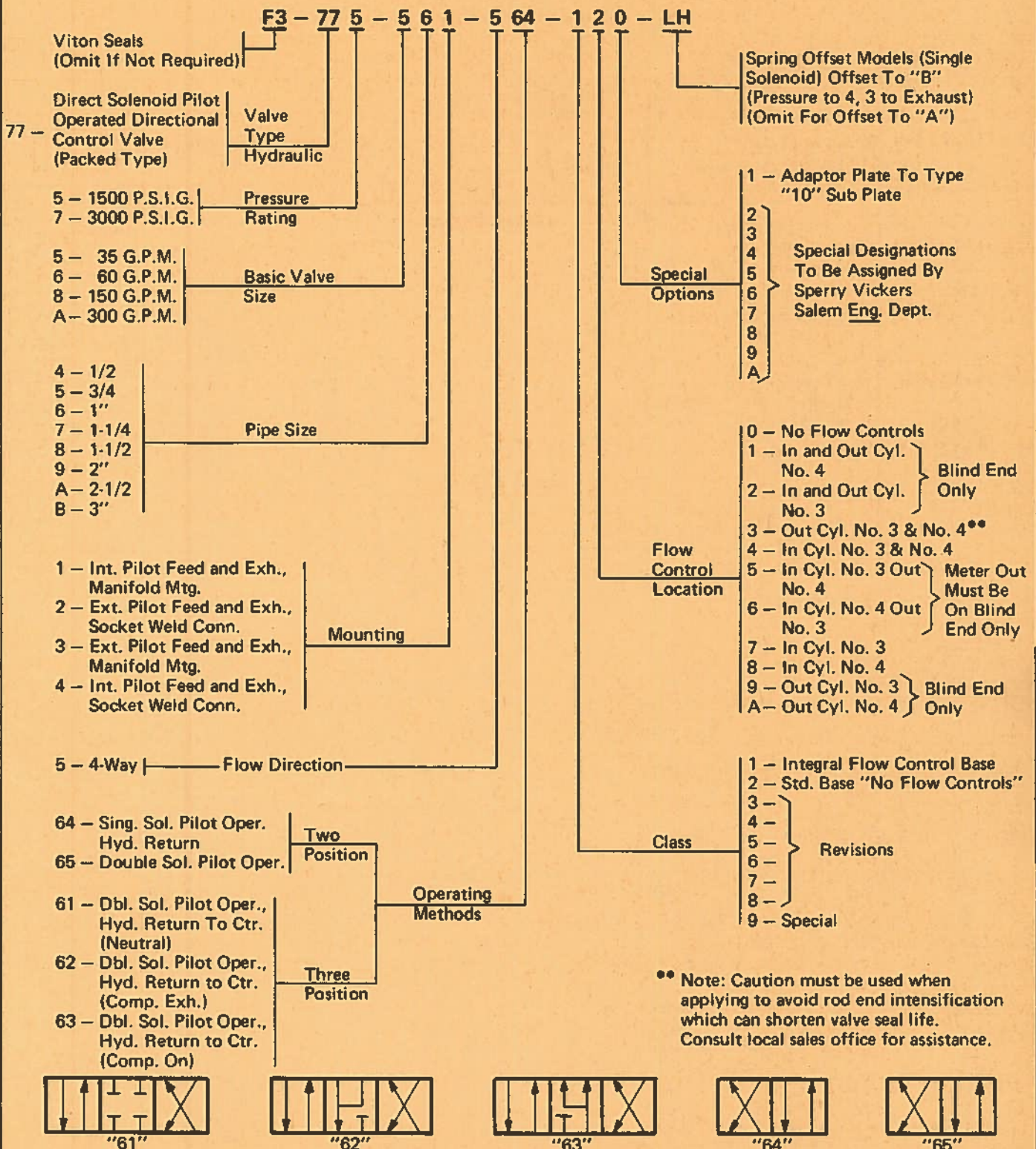
● Blind End Only

■ Meter Out Must Be On Blind End Only



# CODE KEY HIGH PRESSURE HYDRAULIC VALVES

## MODEL "76"



### MODEL CODES

Model codes in this catalog list many options. Some possible model combinations are not readily available. Please contact your Sperry Vickers representative to verify availability.

SPERRY VICKERS

SALEM, OHIO 44480  
DIVISION OF SPERRY RAND CORPORATION

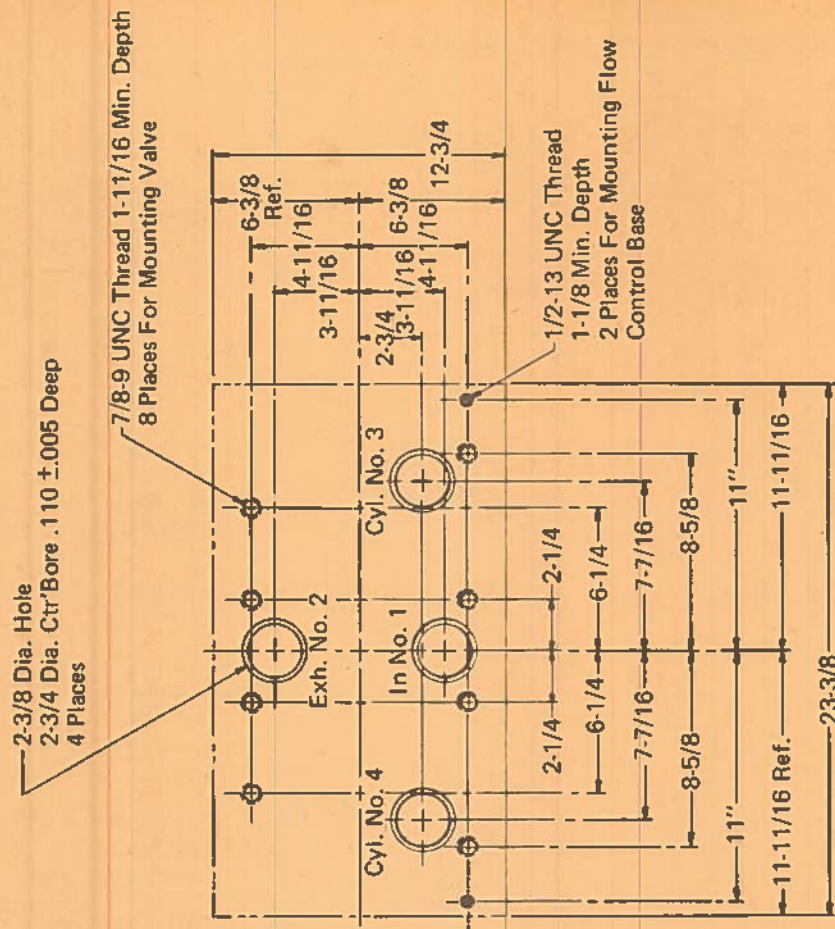
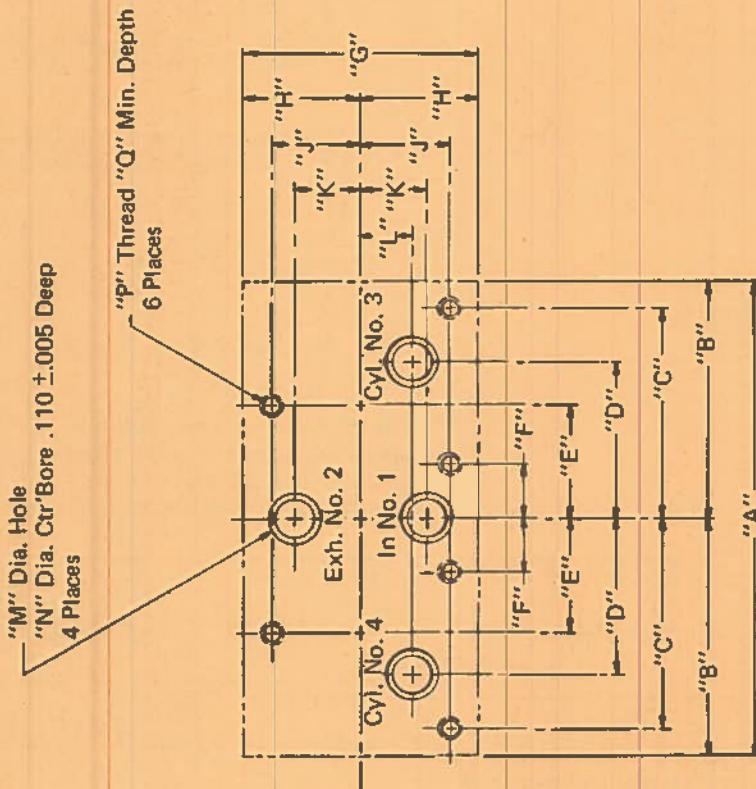
TITLE

CODE KEY  
DIRECT SOLENOID, HYDRAULIC PILOT  
OPERATED, MODEL 76 HYDRAULIC VALVES

DWG. NO.

P-1873-C





300 GPM MODEL

MODEL	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q
35 GPM	10-7/16	5-7/32	4-5/8	3-7/16	2-1/2	1-3/16	5-1/8	2-9/16	1-15/16	1-7/16	1-1/8	27/32	1-1/8	1/2-13 UNC	1-1/8
60 GPM	12-3/4	6-3/8	5-9/16	4-7/16	3-1/4	1-7/16	6-1/2	3-1/4	2-3/8	1-7/8	1-1/2	1-3/16	1-1/2	5/8-11 UNC	1-1/16
150 GPM	18-3/4	9-3/8	8-1/4	6-1/2	5-3/8	2-3/8	9-3/8	4-11/16	3-9/16	2-3/4	1-15/16	1-5/8	2"	7/8-9 UNC	1-1/2

**SPERRY-VICKERS**  
SALEM, OHIO 44480  
DIVISION OF SPERRY RAND CORPORATION

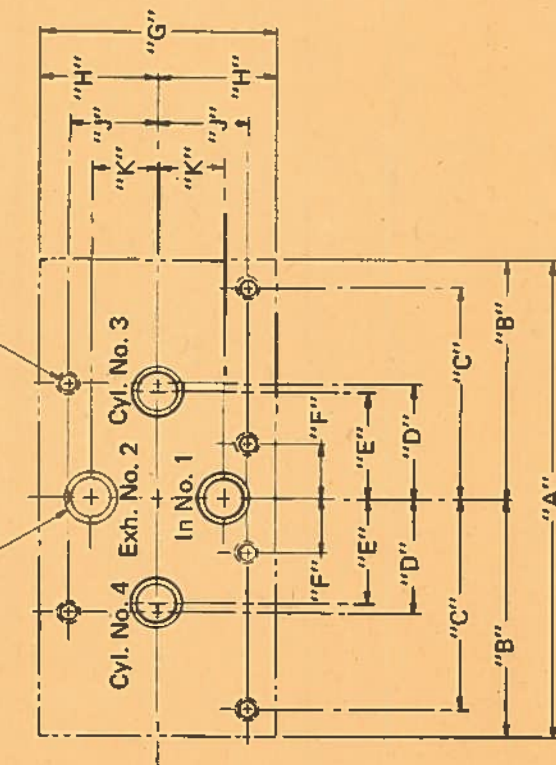
TITLE  
INTERFACE MOUNTING DIMENSIONS "78"  
MANIFOLD WITH FLOW CONTROLS, IMT.  
PILOT FEED AND EXH. INT. VENTS

DWG. NO. P-1187-A



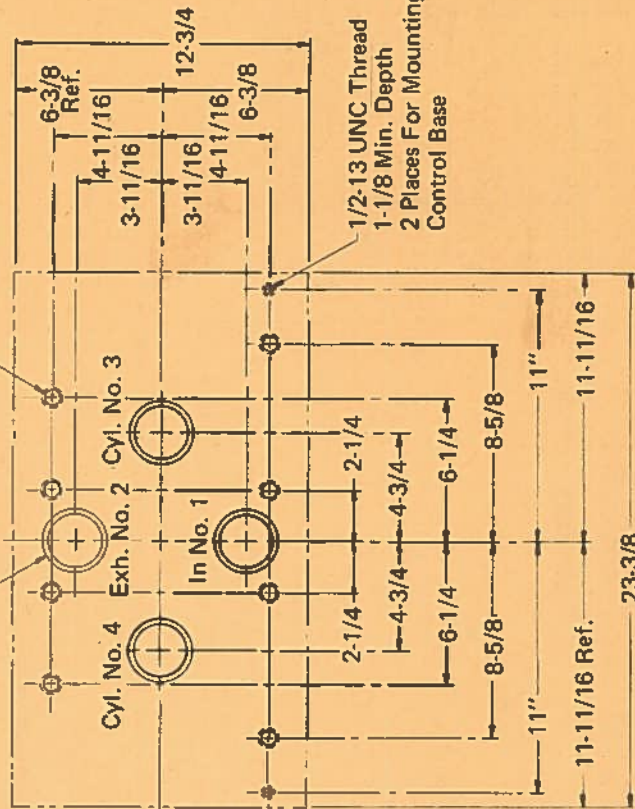
"L" Dia. Hole  
"M" Dia. Ctr Bore .110 ±.005 Deep  
4 Places

"N" Thread "p" Min. Depth  
6 Places



2-3/8 Dia. Hole  
2-3/4 Dia. Ctr Bore .110 ±.005 Deep  
4 Places

7/8-9 UNC Thread  
1-1/16 Min. Depth  
8 Places For Mounting Valve



### 300 GPM MODEL

MODEL	A	B	C	D	E	F	G	H	J	K	L	M	N	P
35 GPM	10-7/16	5-7/32	4-5/8	2-1/2	2-5/16	1-3/16	5-1/8	2-9/16	1-15/16	1-7/16	27/32	1-1/8	1/2-13 UNC	1-1/8
60 GPM	12-3/4	6-3/8	5-9/16	3-1/4	2-3/4	1-7/16	6-1/2	3-1/4	2-3/8	1-7/8	1-3/16	1-1/2	5/8-11 UNC	1-1/16
150 GPM	18-3/4	9-3/8	8-1/4	5-3/8	4-5/8	2-3/8	9-3/8	4-11/16	3-9/16	2-3/4	1-5/8	2"	7/8-9 UNC	1-1/2

SPERRY VICKERS

SALEM, OHIO 44480

DIVISION OF SPERRY RAND CORPORATION

TITLE

INTERFACE MOUNTING DIMENSIONS "78"  
MANIFOLD WITH FLOW CONTROLS, INT.  
PILOT FEED AND EXH. INT. VERTS

DWG. NO.

P-1197-8





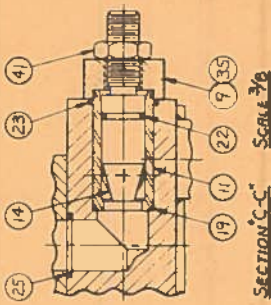
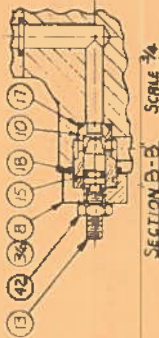
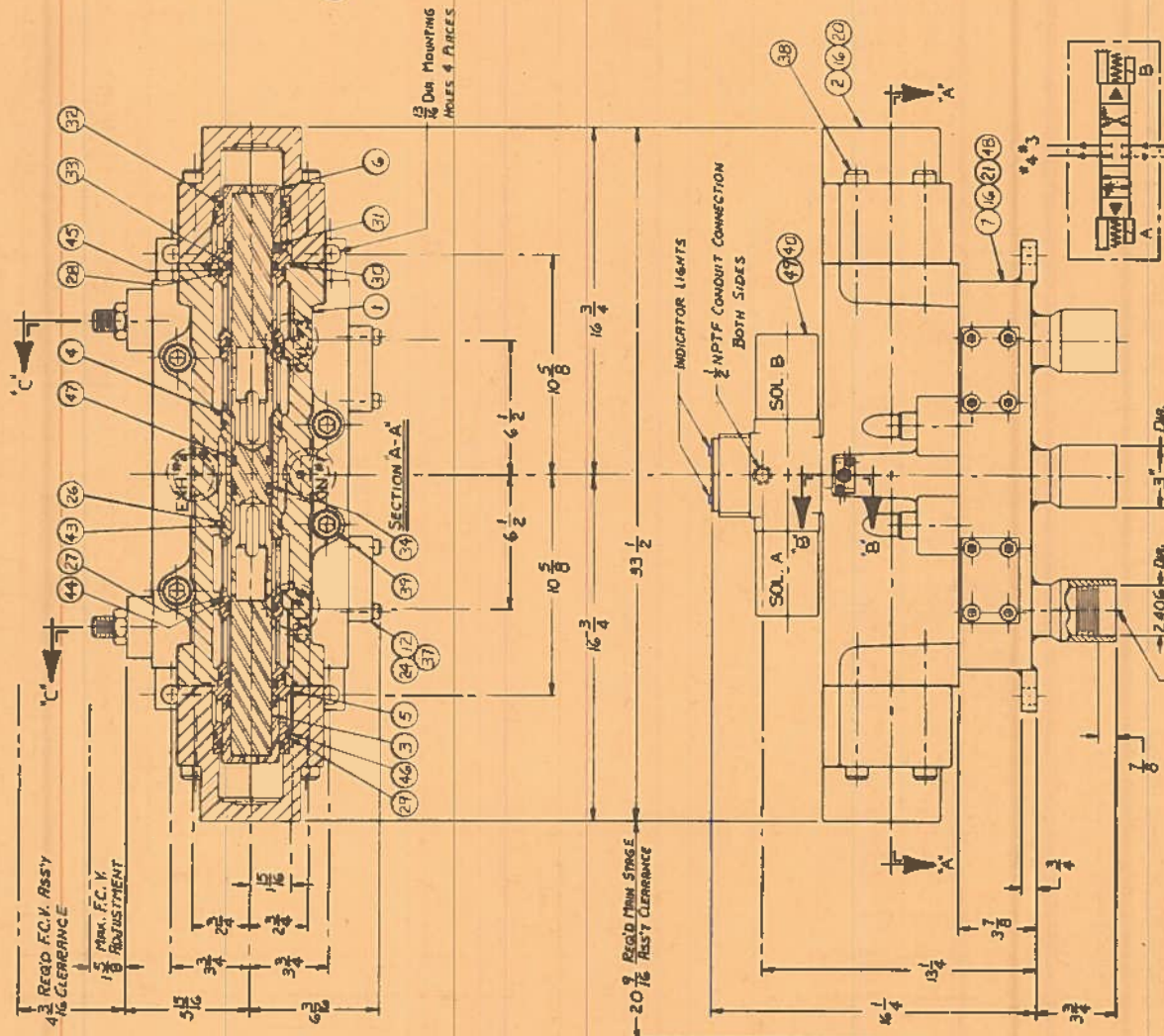






47	2	BACKUP RING	17-326
48	2	1/4 NPT PIPE PLUG	27-012
49	1	PILOT ASSEMBLY	775-531-540-100

QTY	ITEM	DESCRIPTION	PART NUMBER OR MATERIAL
1	1	HOUSING	176-8801
2	2	PILOT CRP	127-8801
3	1	PLUNGER	176-8801
4	1	SLEEVE	176-8802
5	2	CARTRIDGE	176-8801
6	2	PISTON	176-8801
7	1	FLOW CONTROL BASE	176-8801
8	1	FLOW CONTROL END PLATE	176-8801
9	2	FLOW CONTROL END PLATE	176-8801
10	1	FLOW CONTROL SLEEVE	176-8801
11	2	FLOW CONTROL SLEEVE	176-8801
12	2	FLOW CONTROL BASE PLUG	176-8801
13	1	FLOW CONTROL NEEDLE	176-8801
14	2	FLOW CONTROL NEEDLE	176-8801
15	1	SEAL	176-8801
16	6	SEAL	176-8801
17	1	SEAL	176-8801
18	1	SEAL	176-8801
19	2	SEAL	176-8801
20	2	SEAL	176-8801
21	2	SEAL	176-8801
22	2	SEAL	176-8801
23	2	SEAL	176-8801
24	2	SEAL	176-8801
25	5	SEAL	176-8801
26	2	SEAL	176-8801
27	2	SEAL	176-8801
28	2	SEAL	176-8801
29	2	SEAL	176-8801
30	2	SEAL	176-8801
31	2	SEAL	176-8801
32	2	SEAL	176-8801
33	4	SEAL	176-8801
34	2	SEAL	176-8801
35	8	SMCS 3/8-16 UNC x 1/2 LG.	176-8801
36	2	SMCS 1/4-20 UNC x 2 LG.	176-8801
37	8	SMCS 1/4-20 UNC x 2 LG.	176-8801
38	8	SMCS 1/4-20 UNC x 2 LG.	176-8801
39	4	SMCS 1/4-20 UNC x 3 LG.	176-8801
40	4	SMCS 1/4-20 UNC x 3 LG.	176-8801
41	2	1/4 UNF JAM NUT	176-8801
42	1	1/4-28 UNF JAM NUT	176-8801
43	2	BACKUP RING	176-8801
44	2	BACKUP RING	176-8801
45	2	BACKUP RING	176-8801
46	2	BACKUP RING	176-8801



**SPERRY VICKERS**  
SALEM, OHIO 44480  
DIVISION OF SPERRY RAND CORPORATION

TITLE  
183 GPM AWAY 3 POS. NEUTRAL SOL.  
PILOT OPER. 8KT. WELD CONN., 1500 PSI G  
DWG. NO. 775-531-540-100

**SPECIAL RSR SYMBOL**  
For Complete Symbol See Sheet RSR-117



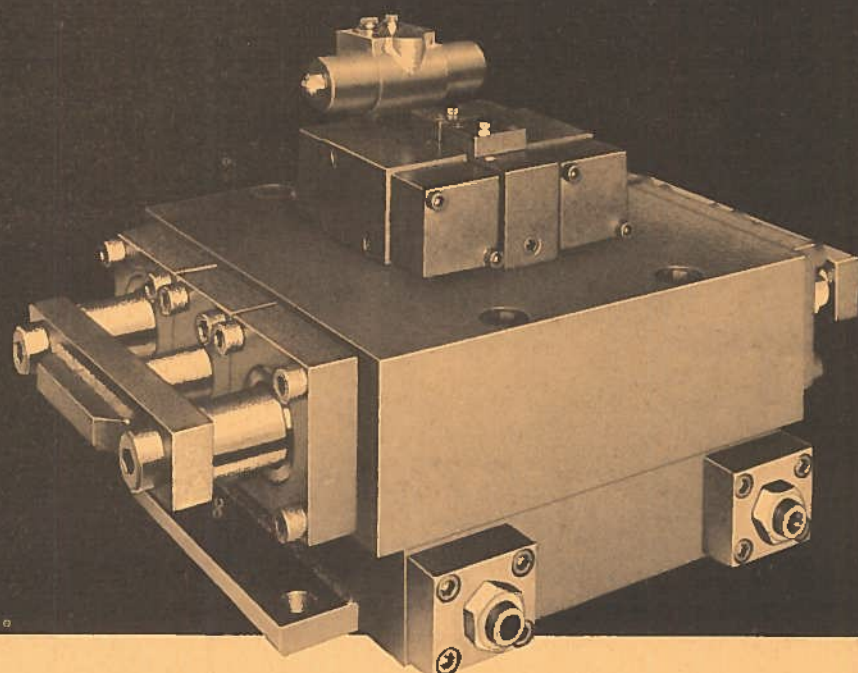








specify the **UNMATCHED FEATURES** of the



**SALEM**  
**SS 99**  
UNITIZED  
HYDRAULIC  
VALVE

Patents Issued and Patents Pending

#### FOR USE WITH WATER SOLUBLE OIL HYDRAULIC SYSTEMS

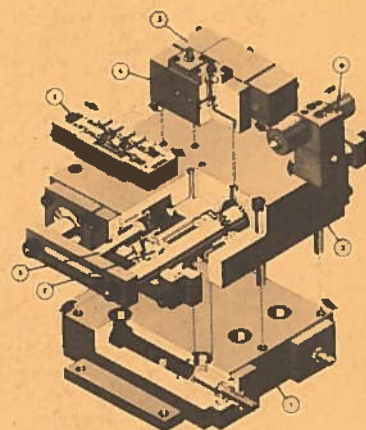
The SS-99 is a unitized hydraulic valve, designed for water soluble oil hydraulic systems. Completely free of extraneous piping, it is a clean, compact, hydraulic pilot operated, directional control unit . . . Reduced to half the size of a conventional packed valve, it will outperform and outlast any valve in use today. Removable, modular sub-assemblies provide substantial savings in mounting space, maintenance time and piping costs. Aside from system connections, the only piping required is a single 1/4 inch air pilot line to the sub-base.

Hydraulic pilot operators, located between the main plungers are actuated by main system hydraulic fluid fed through internal flow passages from the hydraulic pilot assembly. This full utilization of system pressure coupled with adjustable pilot flow controls provide repeatable millisecond response and a dramatic reduction in hydraulic shock.

Infinite meter-in or meter-out speed control of traverse cylinders, hoists, etc., is possible with readily accessible metering valves located in the sub-base. This exclusive patented feature eliminates the need for conventional line mounted flow control valves.

The SS-99 is a "packed" type valve using a resilient seal and a moving chrome plated, ported plunger to effect the valving action. All dynamic seals are in complete hydraulic "balance" and retained in removable packing cartridges for instant replacement. With normal system filtration, this design offers a positive holding action in "neutral", 3-position valves.

The SS-99 is available in a complete range of pipe sizes for flow rates up to 1200 gpm of oil, water base or fire resistant fluids. Pressure ratings are 1500 and 2000 psi.



Cutaway view illustrates the modular sub-assemblies of the SS-99 Valve. (1) Sub-base, showing flow meters with removable seats and stems. (2) Main control valve. (3) Internal hydraulic pistons. (4) Packing cartridges. (5) Pilot flow control base with removable meters. (6) Modular air-operated hydraulic pilot valves. (7) Modular, sub-base mounted solenoid air pilot assembly.

1500 PSI Valve Rating (Max. GPM)	Port Sizes Available	Valve Actions			Valve Positions		Port Connections	
		2-W	3-W	4-W	2-P	3-P	NPT	Skt. Weld
9	3/8", 1/2"	•	•	•	•	•	•	•
42	3/4", 1", 1 1/4"	•	•	•	•	•	•	•
78	1 1/4", 1 1/2"	•	•	•	•	•	•	•
116	1 1/2", 2"	•	•	•	•	•	•	•
163	2", 2 1/2"	•	•	•	•	•	•	•
253	2 1/2", 3"	•	•	•	•	•	•	•
550	3", 4"	•	•	•	•	•	•	•

253 GPM and 550 GPM models are available with socket-weld or ASA flanged connections.

**SPERRY VICKERS**

DIVISION OF SPERRY RAND CORPORATION  
P.O. BOX 180  
SALEM, OHIO



MODEL "SS-99"

HYDRAULIC PILOT OPERATED HYDRAULIC VALVES

1500 PSI – 2000 PSI

SALEM VALVE COMPANY'S "SS-99" hydraulic control valve is designed to provide broad limits in system control, equipment life, and ease of maintenance. The pages which follow contain brief descriptions of the many ways that "SS-99" can improve your operating efficiency.

OUTLINE OF TECHNICAL DATA

MAXIMUM PRESSURE RATING – 1500 PSI and 2000 PSI of water-soluble, oil, mineral oil, and various synthetic fluids.

PILOT PRESSURE – 500 PSI to 2000 PSI.

ACTUATING MEANS – Solenoid, Air, Hydraulic Pilot – Model 20  
– Direct Solenoid/Hydraulic – Model 76

MOUNTING – All units through 253 GPM size are sub-base mounted. 550 GPM units furnished with socket weld fittings or ASA flanges.

PORT CONNECTIONS – Available with tapped ports or socket weld couplings.

Available sizes, flow rates and valve actions are illustrated in the following chart:

VALVE RATING GPM (MAX.)		PORT SIZES AVAILABLE	VALVE ACTIONS			VALVE POSITIONS		PORT CONNECTIONS	
1500 PSI	2000 PSI		2-W	3-W	4-W	2-P	3-P	NPT	SKT. WELD
9	9	3/8", 1/2"		x	x	x	x	x	x
42	35	3/4", 1", 1-1/4"	x	x	x	x	x	x	x
78	67	1", 1-1/4", 1-1/2"	x	x	x	x	x	x	x
116	105	1-1/4", 1-1/2", 2"	x	x	x	x	x	x	x
163	139	1-1/2", 2", 2-1/2"	x	x	x	x	x	x	x
253	237	2", 2-1/2", 3"	x	x	x	x	x		x
550	506	2-1/2", 3", 4"	x	x	x	x	x		x

Models with flows of 253 GPM and 550 GPM are available with socket-weld or ASA flanged connections.



## VALVE DESIGN AND FUNCTION

"SS-99" valves operate on the "packed-hollow plunger" design principal which uses a flexible seal or packing operating over a moving, radially ported, hollow, chrome plated stainless steel plunger. This design is particularly suited for water base, low viscosity fluids and is ideal for mineral oil service since positive holding actions are obtainable with three-position valves. As the operating pressure increases, the flexible seal is forced against its O.D. and I.D. mating surfaces, thus effecting a "zero leakage" action.

As internal parts wear or are damaged, simple replacement with inexpensive new parts will place the valve in like new condition. Although the initial component cost of this valve design is higher than comparable "metal-to-metal" type spool and poppet valves, the operation and maintenance costs of "packed" valves are greatly reduced over the operating life of the equipment.

The highest quality materials and workmanship are used in the "SS-99". All main plunger bores are equipped with stainless steel sleeves to provide a corrosion free sealing surface for static "O" rings; all piston packings move against chrome plated cylinder walls; pilot valve housings are corrosion resistant aluminum; all dynamic seals are made from specially selected elastomers, and all plungers and pistons are made from stainless steel. All flow control components are furnished in heat treated and hardened stainless steel for maximum protection against erosion.

The "unitized" "SS-99" valve is composed of sub-assemblies which can be removed and replaced in a matter of minutes, thus permitting "on the line" maintenance. Interchangeability of pilot valve components and parts provides for a marked reduction in inventory of spare parts. In addition, the packing "cartridge" assemblies in the pilot valves and main valve assemblies allow the replacement of packings with an absolute minimum amount of downtime.

"SS-99" offers complete accessibility to all packing areas and has been designed in such a way as to make incorrect re-assembly practically impossible.

## PILOT SYSTEM DESIGN AND OPERATION

Prior to the introduction of the SALEM "SS-99" valve, overhanging air cylinder actuators were used to move the valve plungers. This design required a separately mounted air pilot valve on a separate "shelf" on the valve stand. The cylinders required large volumes of compressed air, and because of the compressibility, shifting time and motion were erratic.

### MODEL 20 AIR/HYDRAULIC PILOT

The small volume of pilot air (50 to 125 PSIG) required only to move the small "SS-99" pilot valve plungers permits instantaneous shifting response. The "self-contained" hydraulic pilot operators provide an infinitely adjustable and repeatable plunger shifting action, thus enabling the equipment being operated to function according to the pre-set sequence.

### MODEL 76 ALL HYDRAULIC PILOT

Mounting directly to the Model 99 main stage, the Model 76 hydraulic pilot utilizes the systems pressure and fluid (water-, water soluble, oil, low viscosity fluids) to shift the main valve via the same operating sequence as the Model 206 - air hydraulic pilot.

Direct wet plunger DC solenoid(s) provide instant positive response with maximum burn out protection.

Optional external pilot construction also available - pressure must be 500-2000 PSI.

Existing air piloted Model 99 valves can easily be converted to hydraulic pilot systems - consult the factory for details.

## SOLENOID ELECTRICAL CHARACTERISTICS

Inrush Current - 4.5 Amps @ 115V-60Cy

Holding Current - 0.58 Amps @ 115V-60Cy

For voltages other than 115/60/50 consult factory.



LOW-MAINTENANCE  
**SALEM  
VALVES**

The "self-contained" hydraulic actuators eliminate the overhanging air cylinder actuator thus effecting a space savings and reducing the overall size of the valve mounting stands. In addition, the integrally mounted hydraulic pilot valves, which are supplied with pressure and exhausted internally, further reduce the size and complexity of the mounting stands.

Elimination of the large overhanging air cylinders provides complete accessibility to all valve packing chambers and eliminates the necessity of removing the large cylinder for packing replacement. This in itself offers a sizeable savings in manpower over the life of the valves.

System shock control is possible with the "SS-99". Integral pilot flow control devices are designed into each unit to provide an infinitely adjustable control of the pilot fluid into the out of the operating cylinders. These controls regulate the shifting speeds of the main valve plungers thus permitting the reduction or elimination of system shocks caused by opening or closing a control valve too fast.

An additional means of system control is provided by optional built-in flow control devices in the "SS-99" sub-base. This patented scheme for regulating the shifting speed of the operating cylinder being controlled by the "SS-99" valve eliminates the line mounted flow controls normally found in a hydraulic system. The design conveniently locates the flow control adjustment at the valve stand while eliminating four pipe connections which could become possible sources of leakage. In addition, the flow controls may now be by-passed along with the control valve, during the "flushing" of the hydraulic system, prior to startup.

**SOLENOID - AIR PILOT ASSEMBLY**

Three sub-assemblies are used to pilot the entire line of "SS-99" valves. These are, (1) Single solenoid normally closed, (2) Single solenoid normally open, and (3) Double solenoid (2 and 3 position actions). All sub-assemblies are complete with up-to-date features; junction box, manual overrides, electrical indicating lights showing the presence of electricity in the assembly, and molded solenoid coils having inrush and holding amperages which can be calculated by the following:

**FOR 60 CYCLE**

$$\text{Inrush} = \frac{30}{\text{Voltagess}}$$

$$\text{Holding} = \frac{20}{\text{Voltagess}}$$

**FOR ALL D.C.**

$$(\text{Inrush} = \text{Holding})$$

$$\text{Amps} = \frac{9.5}{\text{Voltage}}$$



**DIVISION OF SPERRY RAND CORPORATION  
P.O. BOX 160 SALEM, OHIO**



# UNITIZED PACKING CARTRIDGES

FOR 1500 PSI AND 2000 PSI VALVES

The replacement of worn or damaged seals in a SALEM "packed-hollow plunger" valve design enables the user to achieve a new valve action (provided valve plungers are undamaged). It is this feature which makes this valve type particularly adaptable to water and water-soluble oil hydraulic systems.

FIG. 1 depicts the multiple piece assembly used in each packing chamber of a SALEM "packed-plunger" valve. Although the replacement cost of the seals and other internal parts is relatively low, the time required for removal and replacement can become a burden to the average Maintenance Department. In addition, the incorrect assembly of parts (internal "U" packings must be positioned with the open side facing the pressure chamber) can result in premature packing failure, inoperable equipment, and additional system "downtime".

An innovation in the internal design of "packed-plunger" valves was included in the SALEM model "SS-99" valves. These unitized packing cartridges are shown in FIG. 2.

The one piece metal cartridges designed to fit SALEM type '105' (1500 psi) and '106' (2000 psi) valves contain all required seals and enables the removal and replacement of all parts at one time with a pre-packed cartridge taken from a Central Stores Department. This design greatly simplifies replacement procedures and minimizes "downtime" as well as virtually eliminating the possibility of incorrect packing assembly.

The chart below contains all necessary cross-reference information to enable the use of the proper unitized packing cartridge in type '105' and '106' valves ( $\frac{1}{2}$ " through 3" sizes). Four-way valves require 4 cartridges, three-way valves 2 cartridges and 2 unitized plunger guides; and two-way valves require 1 cartridge and 1 unitized plunger guide.

## CHART OF PARTS

Type '105' & '106' Basic Valve Size*	SS-99 Basic Flow Size (GPM)	Unitized Cartridge Part No. 1	Seal Part No. 2	Seal (2 Pcs. Req'd.) Part No. 3	Seal Part No. 4	Seal Part No. 5	Wiper Part No. 6
$\frac{1}{2}$ "	42	1499-5501	11-606-9C	11-029-9N	10-044	11-135-9N	36-009
1"	78	1499-6601	11-610-9C	11-033-9N	10-040	11-143-9N	36-007
1- $\frac{1}{4}$ "	116	1499-7701	11-608-9C	11-037-9N	10-045	11-236-9N	36-010
1- $\frac{1}{2}$ "	163	1499-8801	11-611-9C	11-151-9N	10-046	11-241-9N	36-011
2"	253	1499-9901	11-612-9C	11-153-9N	10-047	11-247-9N	36-012
3"	550	1499-8801	11-609-9C	11-157-9N	10-060	11-258-9N	36-019

\*See Catalog Page 105-3

Two-way and three-way valves require the use of "unitized plunger guides" in the housing plunger bore opposite the unitized packing cartridges. The use of these "guides" enables the removal of a separator from the housing assembly and provides for the speedy replacement of plunger end seals. These "guides" are shown in FIG. 3.

Unitized packing cartridges and guides are not available for use in  $\frac{1}{2}$ " Type '105' and '106' valves. Internal "U" packings in this size may be replaced by high tensile "O" rings and special backup rings.

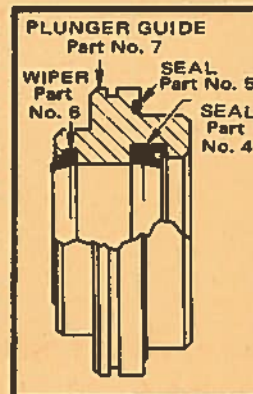


FIGURE 3

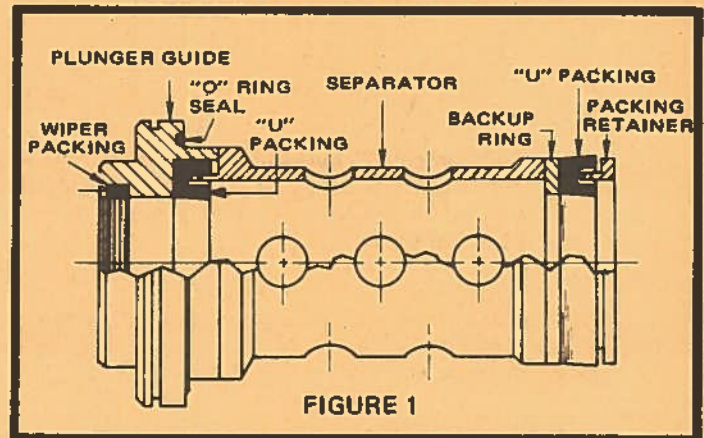


FIGURE 1

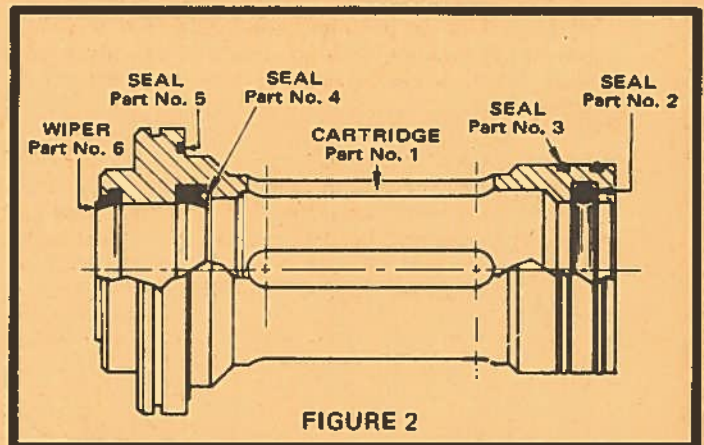


FIGURE 2

Valve Size	SS-99 Basic Flow Size (GPM)	Unitized Plunger Guide Part No. 7	Wiper Part No. 6	Seal (O-Ring) Part No. 5	Seal (U-Packing) Part No. 4
$\frac{1}{2}$ "	42	1399-5501	36-009	11-135-9N	10-044
1"	78	1399-6601	36-007	11-143-9N	10-040
1- $\frac{1}{4}$ "	116	1399-7701	36-010	11-236-9N	10-045
1- $\frac{1}{2}$ "	163	1399-8801	36-011	11-241-9N	10-046
2"	253	1399-9901	36-012	11-247-9N	10-047
3"	550	1399-8801	36-019	11-258-9N	10-060

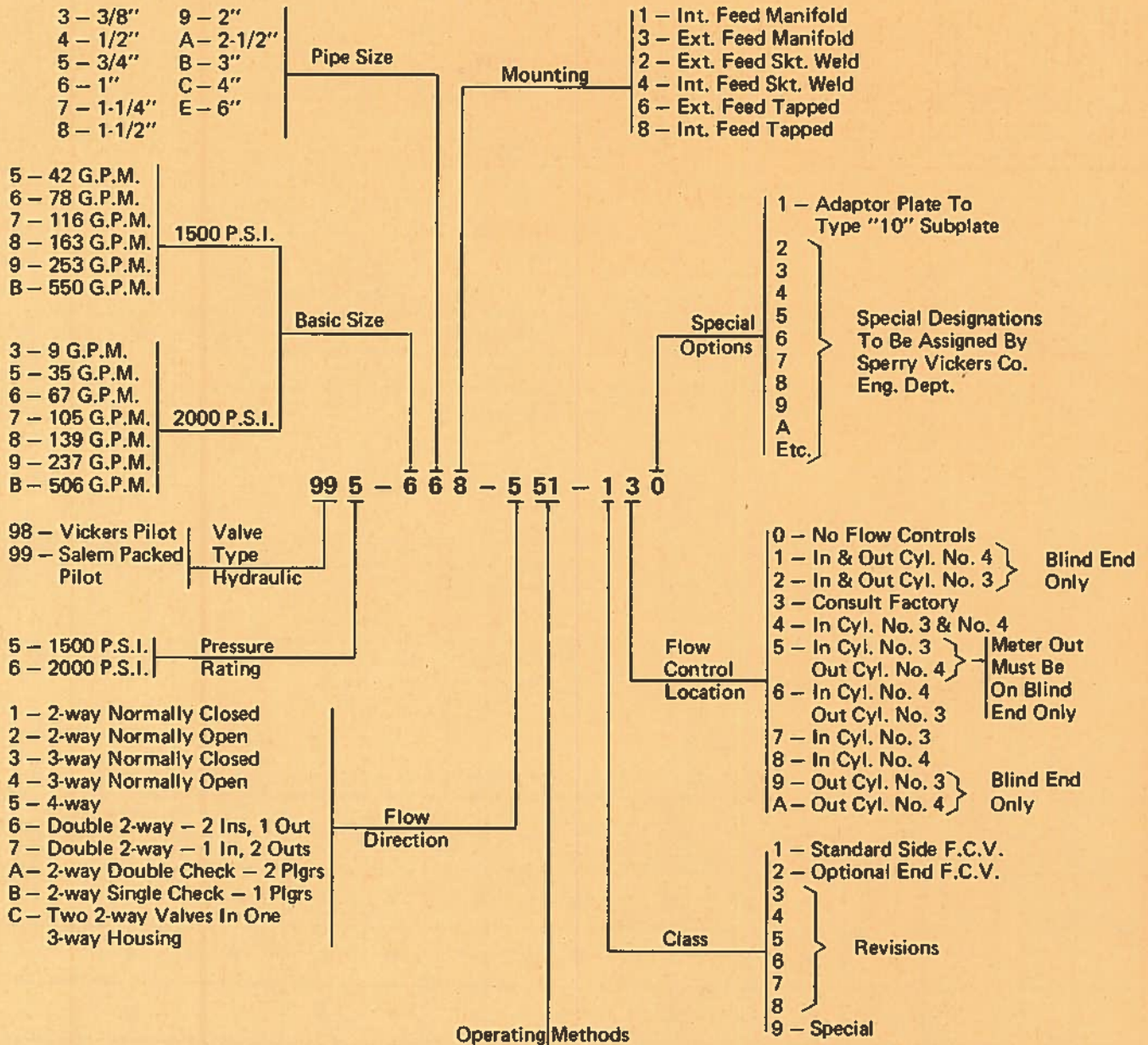
Prices, packing replacement procedures and availability of the parts described may be obtained from your Salem Representative.







**CODE KEY**  
**HIGH PRESSURE HYDRAULIC VALVES**  
**MODEL "99"**



**MODEL CODES**

Model codes in this catalog list many options. Some possible model combinations are not readily available. Please contact your Sperry Vickers representative to verify availability.

<b>SPERRY VICKERS</b> SALEM, OHIO 44480 DIVISION OF SPERRY RAND CORPORATION	
TITLE CODE KEY 2000 PSIG HYDRAULIC VALVES SERIES 99	
DWG. NO.	P-1073-A





LOW-MAINTENANCE  
**SALEM  
VALVES**

MODELS "105" - "108"

HIGH PRESSURE HYDRAULIC VALVE FUNCTIONAL DATA

1500 PSI - 4000 PSI

INTRODUCTION:

Salem valves are designed and manufactured to the most rigid tolerances to provide years of continuous trouble-free operation. Components are machined from bronze, stainless or carbon steel and chrome plated where necessary to assure continuity of service even under the most severe operating conditions.

Factors of safety up to 5 on yield strength of the metals have been utilized to produce a valve that will withstand hydraulic shock conditions without distortion of working parts.

FEATURES:

Salem valves are precision machined for use with any of the common hydraulic fluids, from raw water to the new synthetics. They are especially suited for water soluble oil in systems where conventional valves fail to seal a low viscosity fluid. Resilient "U" packings guarantee absolute zero leakage, thus eliminating the by pass of high pressure fluid.

Designed to handle machine applications of nearly unlimited range, Salem valves will enable machinery such as rolling mills, extrusion presses, forging presses, hot steel mill descaling and hydrostatic testing systems to operate continuously at maximum efficiency with a minimum of down time.

The following chart summarizes the Model "105" and "108" valves with additional data on succeeding pages:

Valve Size	Max. Press. (PSI)	Min. Area Sq.In.	Max. Flow (GPM)*	FLOW DIRECTION			OPERATOR		POSITION		PORT CONNECTIONS		
				2-way	3-way	4-way	Lever**	Pilot	2	3	Tapped	Sub-plate	Flanged
1/2"	1500 4000	.161 .093	10.0 5.8	●	●	●	●	●	●	●	●	●	
3/4"	1500 4000	.479 .277	29.8 17.3	●	●	●	●	●	●	●	●	●	
1"	1500 4000	.887 .590	55.2 36.8	●	●	●	●	●	●	●	●	●	
1-1/4"	1500 4000	1.325 .785	82.5 49.0	●	●	●	●	●	●	●	●	●	
1-1/2"	1500 4000	1.917 1.227	119.5 76.5	●	●	●	●	●	●	●	●	●	
2"	1500 4000	2.948 2.237	184.0 139.5	●	●	●		●	●	●	●	●	●
3"	1500 4000	6.49 5.41	405.0 337.0	●	●	●		●	●	●			●
4"	1500 4000	12.56	788.0	●	●	●		●	●	●			●
6"	1500	20.63	1287.0		●	●		●	●	●			●
8"	FOR DETAILS SEE SECTION ON DESCALING VALVES "115" AND "117"												

- \* Flow rate based on maximum recommended velocity through the valve of 20 feet per second.  
 \*\* Lever operated valves available through 1" only in 4000 PSI range.





LOW-MAINTENANCE  
**SALEM  
VALVES**

#### MATERIALS OF CONSTRUCTION:

Valve plungers are machined from stainless steel, ground, chrome plated and polished to further minimize wear. Plungers are hollow and radially ported. Flow is directed from one housing chamber, through the hollow plunger, into receiving chamber. Ports have radius to prevent cutting of packings.

All valves are furnished with either corrosion resistant brass or stainless steel packing seats. On each end of the valve, the "U" packing is seated in the brass plunger guides; in the center of the valve, the "U" packing is seated in a stainless steel sleeve which is seal welded into the housing bore. Fluid leakage normally caused by corrosion of the sealing surfaces is thereby eliminated through the use of these materials.

#### MAINTENANCE:

All pilot air cylinders, for each size, utilize the same spacer construction between cylinder assembly and housing assembly. By simply removing the plunger pin and four tie rod nuts, the cylinder can be removed in minutes.

Under normal operating conditions, only one part of the Salem valve needs periodic attention. This is the self wear compensating resilient seal "U" packing. Its replacement can be made easily at the valve mounting location. For emergency repairs, entire valve can be quickly removed from sub-plate and replaced with a spare.

To reduce complexity and expense of maintenance, the mounting face on 3 and 4-way valves are identical. Corresponding valve operating mechanisms have matching face plates and are designed to be completely interchangeable, whether lever or pilot, 2 or 3 position. With the exception of plungers, all internal parts of each size 2, 3 or 4-way are also interchangeable on valves to 4000 PSI. This feature is shown pictorially below.

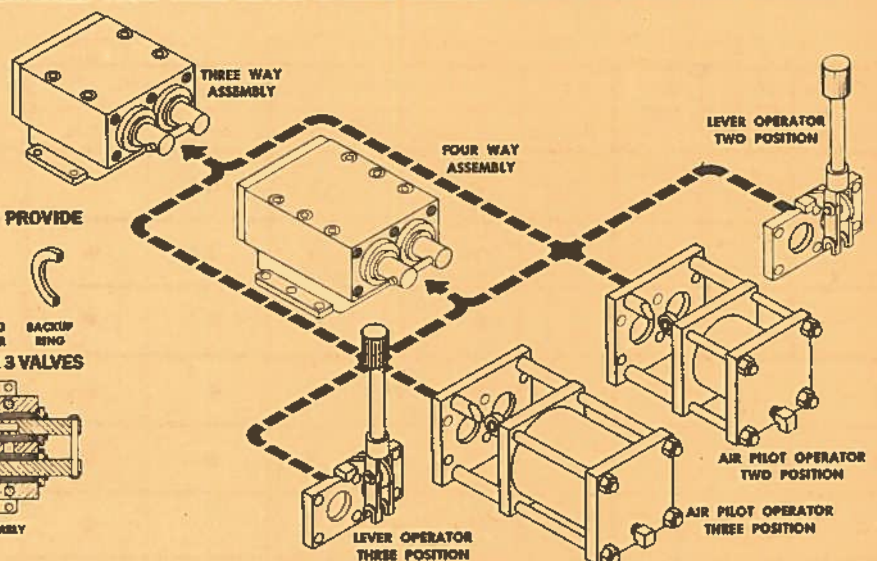
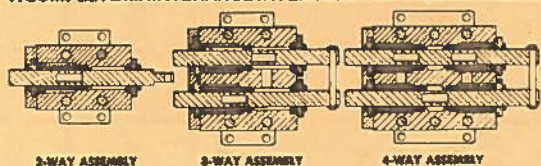
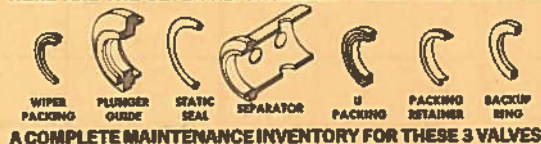
This design versatility means that by maintaining an interchangeable inventory of 2 valve assemblies and one each of the 4 operators, the user replaces the conventional inventory of 8 separate valve assemblies and 8 operators. Compare this with the complex maintenance inventory requirements of other valve manufacturers, and you will agree that Salem is a valve designed with economic maintenance in mind.

### HERE AT A GLANCE ARE THE DESIGN FEATURES THAT WILL MAKE SALEM VALVES YOUR NUMBER ONE CHOICE

Right: Illustration shows the four standard operating mechanisms. Without any modification, any one of the four will operate either three way or four way valves of corresponding size.

Below: These seven internal components are standardized and interchangeable on either the 2, 3 or 4-way valves.

#### HERE ARE THE SEVEN REPLACEMENT PARTS THAT PROVIDE



**SPERRY VICKERS** DIVISION OF SPERRY RAND CORPORATION  
P.O. BOX 160 SALEM, OHIO



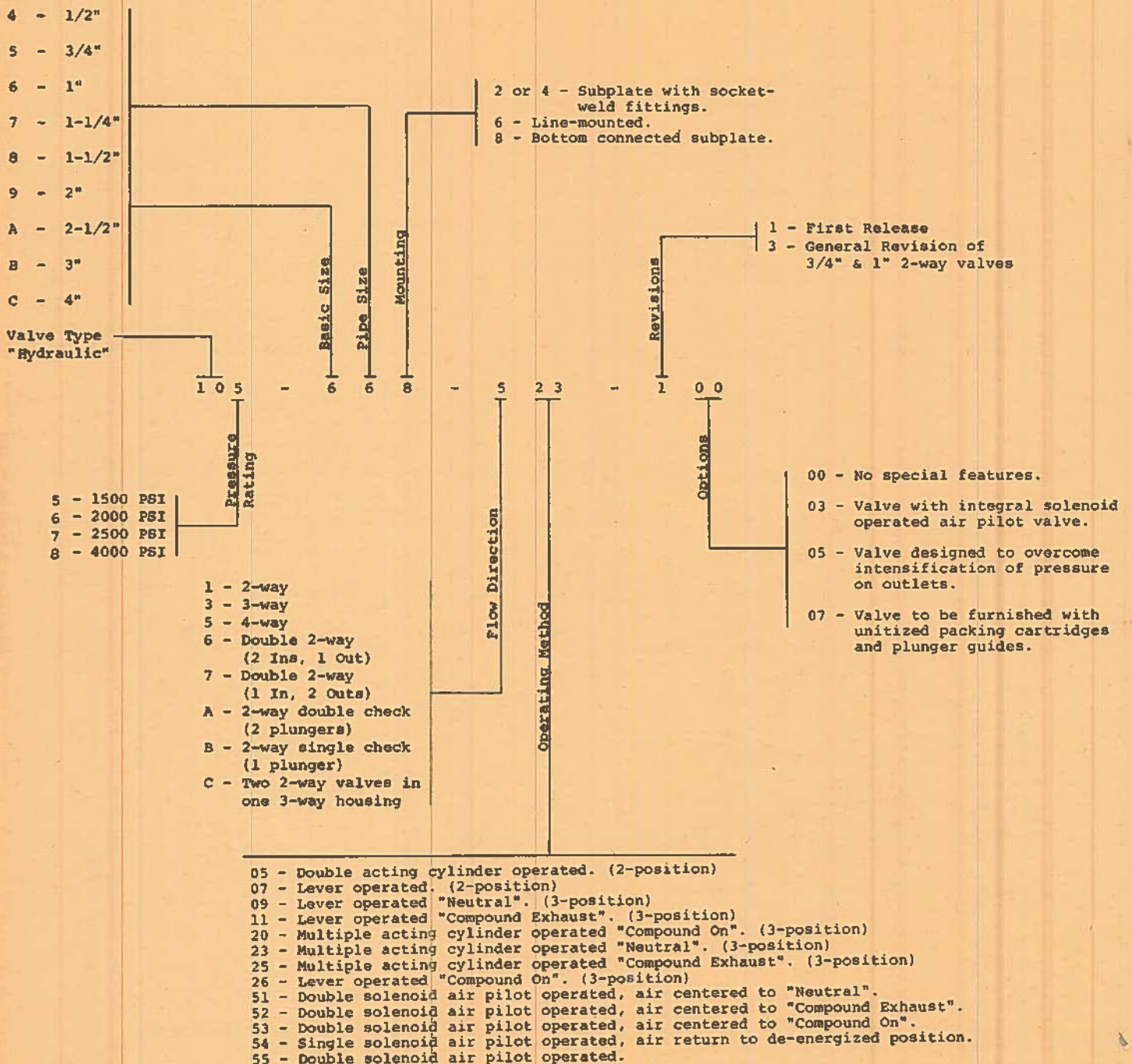


LOW-MAINTENANCE  
**SALEM  
VALVES**

CODE KEY

HIGH PRESSURE HYDRAULIC VALVES

MODELS "105" - "108"











LOW-MAINTENANCE  
**SALEM  
VALVES**

MODEL "142"

AIR VALVE FUNCTIONAL DATA

INTRODUCTION:

Model "142" directional control valves are designed for use with air in a pressure range of 50 to 125 PSIG up to 180° F. in pipe sizes ranging from 3/8" to 2". The machining tolerances and quality control standards which go into these valves insure trouble free service even under the most rigid operating requirements.

FEATURES:

The internal construction of Model "142" valves enables minimum maintenance downtime. The basic 1/2" and 1" valves incorporate one piece cartridges with self-contained "O" rings which permit fast repacking. The larger sizes incorporate uniformly designed separators which may be installed in either direction in any valve chamber.

Manual overrides are available on all units.

The following chart summarizes the Model "142" valves with additional information on succeeding pages:

Basic Valve Size	Avail-able Tap Sizes	FLOW DIRECTION *			POSITION		O P E R A T O R S						SUB-PLATE ** MOUNTING		FLOW SCFM ***
							SOL. PILOT		PILOT		LEVER				
		2-Way	3-Way	4-Way	2	3	Sgl.	Dbl.	Sgl.	Dbl.	Man.	Spr. Ret.	Comb.	Bott.	
1/2"	3/8"		●	●	●	●	●	●	●	●	●	●	●		255
	1/2"		●	●	●	●	●	●	●	●	●	●	●		265
	3/4"		●	●	●	●	●	●	●	●	●	●	●		280
1"	3/4"		●	●	●	●	●	●	●	●	●	●	●		560
	1"		●	●	●	●	●	●	●	●	●	●	●		705
1-1/4"	1"	●	●	●	●	●	●	●	●	●	●	●	●		910
	1-1/4"	●	●	●	●	●	●	●	●	●	●	●	●		1430
1-1/2"	1-1/2"	●	●	●	●	●	●	●	●				●		2060
2"	2"	●	●	●	●	●	●	●	●				●		3530

\* Basic 1/2" and 1" are available as 3-way and 4-way only. For 2-way action specify exhaust port to be plugged and whether NORMALLY OPEN or NORMALLY CLOSED action is required.

\*\* Basic 1/2", 1" and 1-1/4" available with combination side and bottom tapped sub-plate; basic 1-1/2" and 2" available with bottom tapped sub-plate only.

\*\*\* Flow based on free air, 100 PSIG to atmosphere.



#### VALVE SIZES:

The following BASIC valve sizes are available; 1/2", 1", 1-1/4", 1-1/2" and 2". The preceeding chart illustrates the tap sizes available for each basic size.

#### FLOW DIRECTIONS:

Model "142" valves are available as 2-way, 3-way, 4-way; 2-position and 3-position valves. In addition, many non-conventional flow directions are available i.e., one inlet, two outlets; two inlets, one outlet and others depending upon operating requirements.

#### OPERATORS:

##### Lever —

Available in sizes 3/8", 1/2", 3/4", 1" and 1-1/4" and in all flow directions. (2 and 3 position) \*\*

##### Lever with spring return and spring centered —

Available in 3/8", 1/2", 3/4", 1" and 1-1/4" sizes only. (2 and 3 position) \*\*

##### Pilot operated, bucking cylinder return —

Available in all sizes. (2 position)

##### Double pilot —

Available in all sizes. (2 and 3 position air centered) \*\*

##### Single solenoid, bucking cylinder return —

Available in all sizes. (2 position)

##### Double solenoid —

Available in all sizes. (2 and 3 position air centered) \*\*

\*\* Three position valves can be furnished with;

- (1) All ports blocked
- (2) Cylinder ports open to supply, or
- (3) Cylinder ports open to exhaust in the mid position

#### MATERIALS OF CONSTRUCTION:

Model "142" valves are constructed of aluminum throughout except for valve plunger and working parts in the solenoid pilot section which are stainless steel. Aluminum parts which move or contact moving parts are anodized for corrosion resistance.

#### MOUNTING:

The basic 1/2" valve, when solenoid operated, is designed to minimize service time by having the valve housing and solenoid pilot valves mounted separately on the valve sub-plate. In this way either may be removed for repair or replacement without disturbing the other.

The basic 1/2" pilot operated valves have all pilot connections in the valve sub-plate thus enabling service to the main valve without disturbing the pilot connections.

The basic 1/2", 1" and 1-1/4" valves are furnished with a subplate tapped both side and bottom giving pipe connection flexibility. Available tap sizes are given on Page J-32.



Basic 1-1/2" and 2" valves are furnished with bottom tapped sub-plates.

Care should be exercised when mounting 1/2" basic size valves to allow clearance for removal of screws used in holding the solenoid pilot valve to sub-plate.

#### MAINTENANCE:

Each basic size is designed to give maximum interchangeability of parts within that size. The one piece cartridge assemblies in the 1/2" and 1" valves as well as the uniformly designed separators in the 1-1/4" and up sizes make service fast and relatively simple.

All solenoid coils are molded waterproof coils to provide maximum protection for long valve life. Through the use of flexible conduit, access to the moving solenoid pilot parts may be gained by lifting electrical junction box and coil without disturbing electrical wiring.

"O" rings as dynamic seals in the basic 1/2" and 1" sizes eliminates the possibility of assembling packings incorrectly. The 1-1/4", 1-1/2" and 2" valves use "U" packings, thus care must be taken to assemble the packings correctly in these sizes.

The use of sub-plates in all sizes permits the removal of valve body assemblies for maintenance or replacement without disturbing the piping.

#### SOLENOIDS:

All sizes use short stroke solenoid pilot valves with adequately sized orifices to give fast, positive shifting action. The solenoid pilot configuration is fully described on drawing no. 2514-4404 for basic 1/2" size valves and drawings no. 2514-7706 and no. 2514-7707 for basic 1" and larger valves.

All standard valves are furnished with a manual override, electrical junction box and electrical indicating lights.

Valves can be furnished for all conventional AC and DC voltages at operating temperatures up to 180°F. Solenoid coils are molded waterproof coils for maximum life.

The following formulas may be used for computing Inrush and Holding amperage:

##### Basic 1/2" Valves

###### FOR 60 CYCLE A.C.

$$\text{Inrush Amperes} = \frac{30}{\text{Voltage}}$$

$$\text{Holding Amperes} = \frac{20}{\text{Voltage}}$$

###### FOR ALL D.C.

$$\text{Inrush Amperes} = \frac{9.5}{\text{Voltage}}$$

$$\text{Holding Amperes} = \frac{9.5}{\text{Voltage}}$$

##### Basic 1", 1-1/4" & 2"

###### FOR 60 CYCLE A.C.

$$\text{Inrush Amperes} = \frac{67}{\text{Voltage}}$$

$$\text{Holding Amperes} = \frac{30}{\text{Voltage}}$$

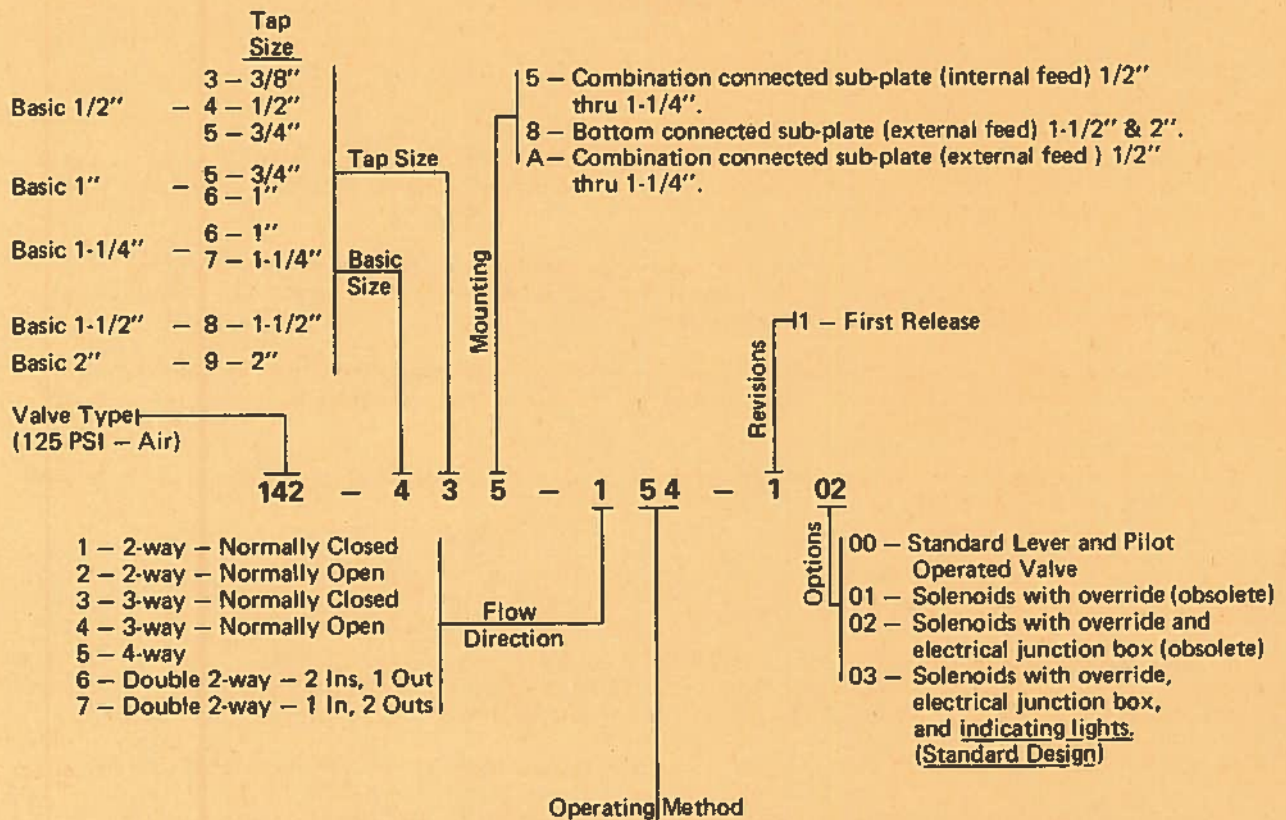
###### FOR ALL D.C.

$$\text{Inrush Amperes} = \frac{13.8}{\text{Voltage}}$$

$$\text{Holding Amperes} = \frac{13.8}{\text{Voltage}}$$



**CODE KEY**  
**MODEL NUMBERING SYSTEM**  
**MODEL "142"**  
**125 PSI**



**TWO POSITION**

- 06 - Double pilot operated.
- 07 - Lever operated, both directions.
- 08 - Lever operated, spring return.
- 28 - Single pilot operated, bucking cylinder return.
- 54 - Single solenoid pilot operated, bucking cylinder return.
- 55 - Double solenoid pilot operated.

**THREE POSITION**

- 09 - Lever operated, detented center in "neutral".
- 10 - Lever operated, spring centered to "neutral".
- 11 - Lever operated, detented center in "compound exhaust".
- 12 - Lever operated, spring centered to "compound exhaust".
- 19 - Double pilot operated, air centered to "compound on".
- 22 - Double pilot operated, air centered to "neutral".
- 24 - Double pilot operated, air centered to "compound exhaust".
- 26 - Lever operated, detented center in "compound on".
- 51 - Double solenoid pilot operated, air centered to "neutral".
- 52 - Double solenoid pilot operated, air centered to "compound exhaust".
- 53 - Double solenoid pilot operated, air centered to "compound on".
- 56 - Lever operated, spring centered to "compound on".

**NOTATIONS:**

Lever valves 1-1/2" and above are not available.

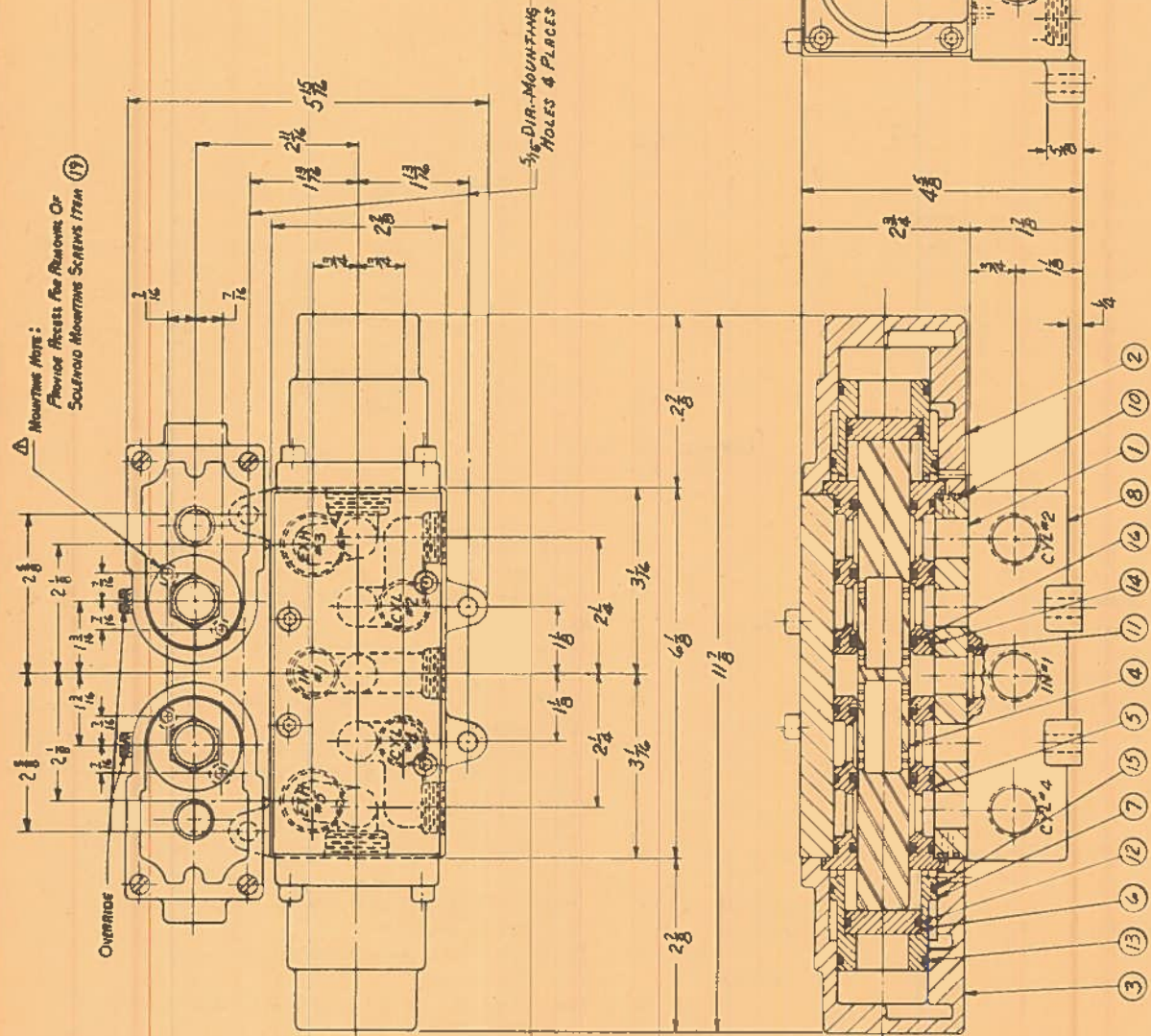
- "Neutral" - Indicates all ports blocked.
- "Compound Exh" - Indicates cylinder ports to exhaust.
- "Compound On" - Indicates cylinder ports to inlet.

**MODEL CODES**

Model codes in this catalog list many options. Some possible model combinations are not readily available. Please contact your Sperry Vickers representative to verify availability.



PARTS LIST		
ITEM	DESCRIPTION	PART NO.
1	HOUSING	1014-4401
2	PISTON CAP (R.H.)	1114-4401
3	PISTON CAP (L.H.)	1114-4402
4	PLUNGER	1214-4401
5	CARTRIDGE	1414-4401
6	OPERATING PISTON	1514-4401
7	CENTERING PISTON	1514-4402
8	BRG	1614-4402
9	SOLENOID PILOT	2514-4404
10	O-RING	11-029
11	O-RING	11-116
12	O-RING	11-121
13	O-RING	11-125
14	O-RING	11-127
15	O-RING	11-129
16	O-RING	11-212
17	SKT. HEAD CAP SCREW	12-026
18	SKT. HEAD CAP SCREW	12-027
19	SKT. HD. CAP SCREW	12-028



**SPERRY VICKERS**  
SALEM, OHIO 44460  
DIVISION OF SPERRY RAND CORPORATION

**TITLE**  
1/2" 3 WAY COMPOUND ON 125 PSI G  
SOLENOID PILOT OPERATED

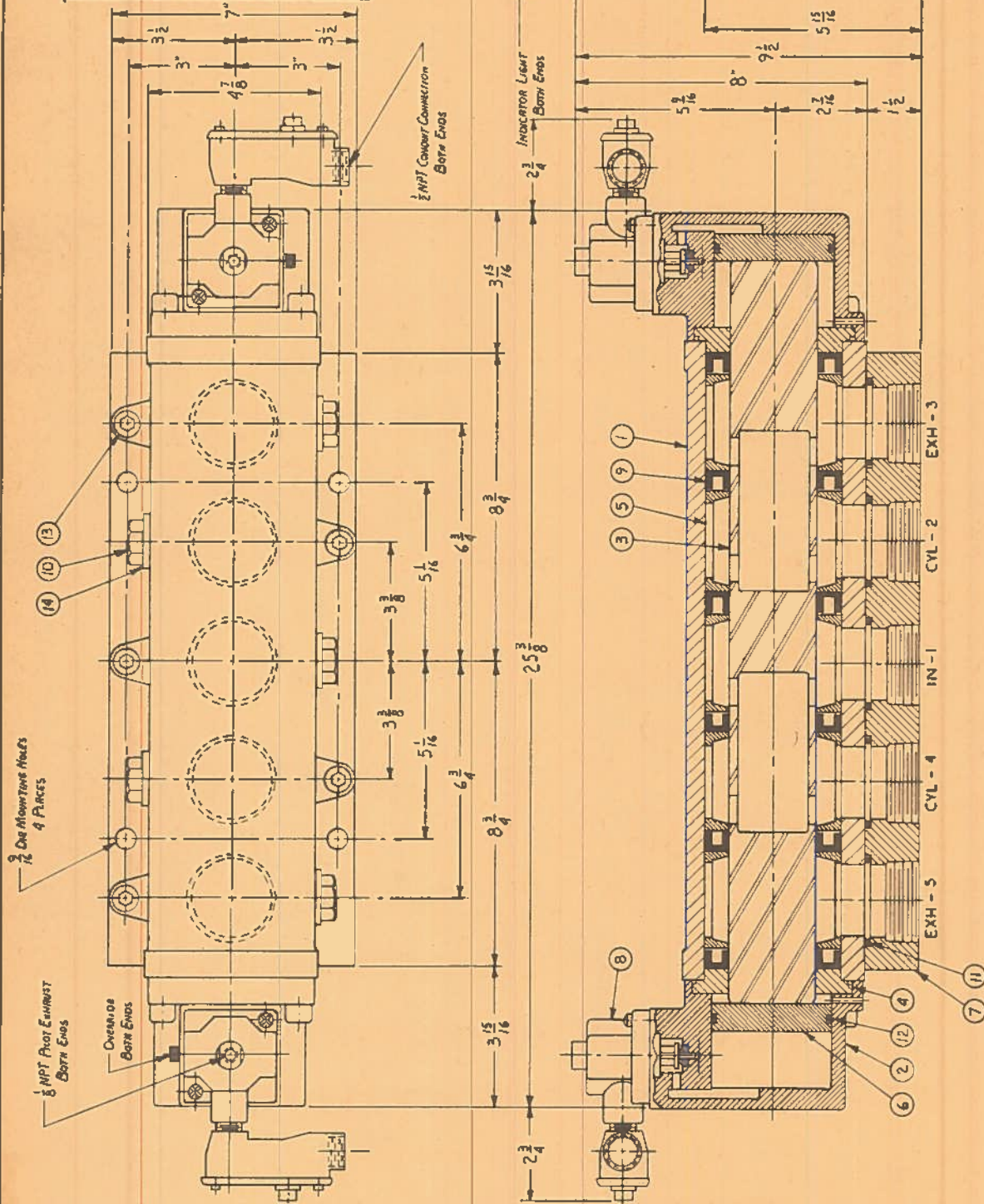
**DWG. NO.**  
142 445-503-103







PARTS LIST		
ITEM	QTY	DESCRIPTION
1	1	Housing
2	2	Solenoid Pilot Cap
3	1	Pumper
4	2	Pumper Guide
5	5	Separator
6	2	Operating Piston
7	1	Base
8	2	Solenoid Pilot
9	6	U-Packing
10	5	Separator Retainer
11	5	O-Ring
12	2	O-Ring
13	13	SKCS 12-13 UNF x 1 1/2 L6
14	5	Screw Washer
		25-002



SPERRY-VICKERS

SALEM, OHIO 44460  
DIVISION OF SPERRY RAND CORPORATION

TITLE

2" 4-WAY, DOUBLE SOLENOID, PILOT OPERATED  
125 PSIG

DWG. NO.

142 996-555-103



**MODEL "117"**

**DESCALING VALVES**

**INTRODUCTION:**

Salem "descaling" valves are designed for smooth efficient operation on even the toughest descaling applications. They are also frequently applied as "accumulator shut-off" valves and for hydrostatic testing equipment where larger valves are required. Years of field service have proven the performance of these valves.

**FEATURES:**

Salem descaling valves utilize circumferential radial ports in a hollow plunger with "U" packing seals for the valving principle.

End-to-end symmetry of design provides identical pilot piston sizes and interchangeable parts. Pilot pistons are not attached to valve "plunger", but rest against it to provide the required thrust. Pistons float in "pilot cylinder" for minimum friction to resist motion. Eight inch size does not require pistons.

The centrifugal brass "plunger guides" have close clearance over the valve "plunger" to give even motion and carry the load away from the "U" packing seals in each guide. The flow chambers of the valve "housing" are designed as short as possible to reduce overall length of the plunger and distance between guides.

The center "U" packing seal rests and seals against a stainless steel seat welded to the steel housing in all sizes. The possibility of corrosion which otherwise would ultimately lead to erosion is thereby reduced or eliminated. The stainless steel seat also provides high shear strength protection against the high pressures exerted in the supply chamber which are applied over the "U" packing in the seat.

All valves may use either air or hydraulic fluid as the pilot medium in the pressure range of 50 to 300 PSIG.

The following chart summarizes the MODEL NUMBERS of the valves available:

Size	Pressure Rating-PSI **	Minimum Area-In <sup>2</sup> *	Flow Rate GPM *	Plgr. Port Area-In <sup>2</sup>	MODEL NUMBERS		
					FLANGE LOCATION		
					180°	90° Right	90° Left
4"	2500	11.05	689	14.91	117-CC1-106-200	117-CC2-106-200	117-CC3-106-200
6"	2500	19.64	1225	25.34	117-EE1-106-100	117-EE2-106-100	117-EE3-106-100
8"	2500	33.20	2070	35.30	117-HH1-106-101	117-HH2-106-101	117-HH3-106-101

\* Flow rate is based on 20 FPS velocity through the minimum area which is the bore of the valve plunger.

\*\* 3000 PSI pressure ratings also available — consult factory.

**MOUNTING:**

All valves are available with 180°, 90° Right and 90° Left Hand flanges as viewed from the mounting pad end with the mounting pad down and inlet flange up. Pressure Class 600, 900, 1500 and 2500 flanges are available with ratings at 100° F of 1440, 2160, 3600 and 6000 PSI. When using a vertical mounting, the inlet flange should be located in the "up" position to provide easy maintenance by removing parts from the top of the valve.

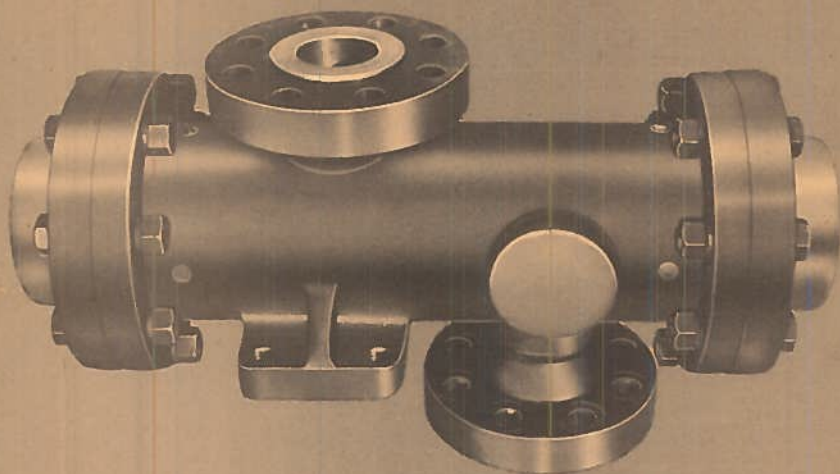
For low pressure (150/350 PSI) hydraulic pilot specify model — 500.

For high pressure (750/2000 PSI) hydraulic pilot specify model — 504.



# SALEM Descaling Components

RELIABILITY is the major requirement of any component designed for operation in today's high pressure, large volume "Descaling" systems. RELIABILITY is SALEM'S primary objective when designing, manufacturing, and servicing products for today's Steel Industry.

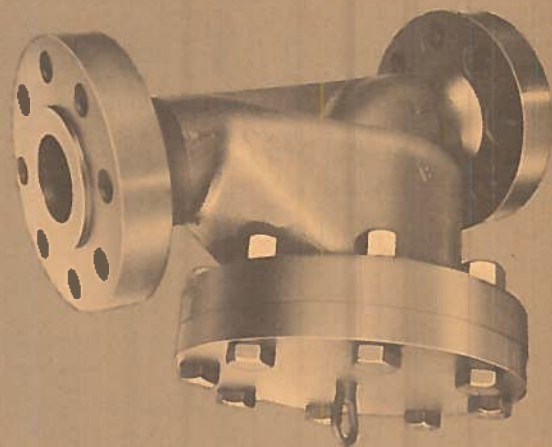


SALEM High Pressure Strainers — SALEM Strainers installed ahead of the Descaling valve protect the valve by stopping system contaminants and thus virtually eliminate the plugging of spray nozzles.

Strainer Basket — Strainer Baskets are unique in design with hardened stainless steel rings which provide long life and easy cleaning. Strainer openings of .028 inch are standard, with smaller openings available upon request. SALEM'S strainer baskets are interchangeable with similar units in your descaling system.



SALEM Descaling Valves — Double end pilot operation and non-corrosive seal contact areas provide smooth operation and long service life. Models are available for pilot operation with air or low pressure and high pressure hydraulic systems. SALEM valves are available to interchange with existing system components.



SALEM Accumulator Control Panels — This guardian control of your Descaling system, assures emergency outlet valve closure when fluid reaches a critical low or high level. The panel is equipped with signaling and liquid level recording devices which automatically open accumulator valve on system start-up. Each panel is custom designed to meet your specific operating conditions.

## Years of successful steel mill operation

Consult your local SALEM Representative, Vickers Distributor or Vickers Sales Office for additional information.

SPERRY  VICKERS